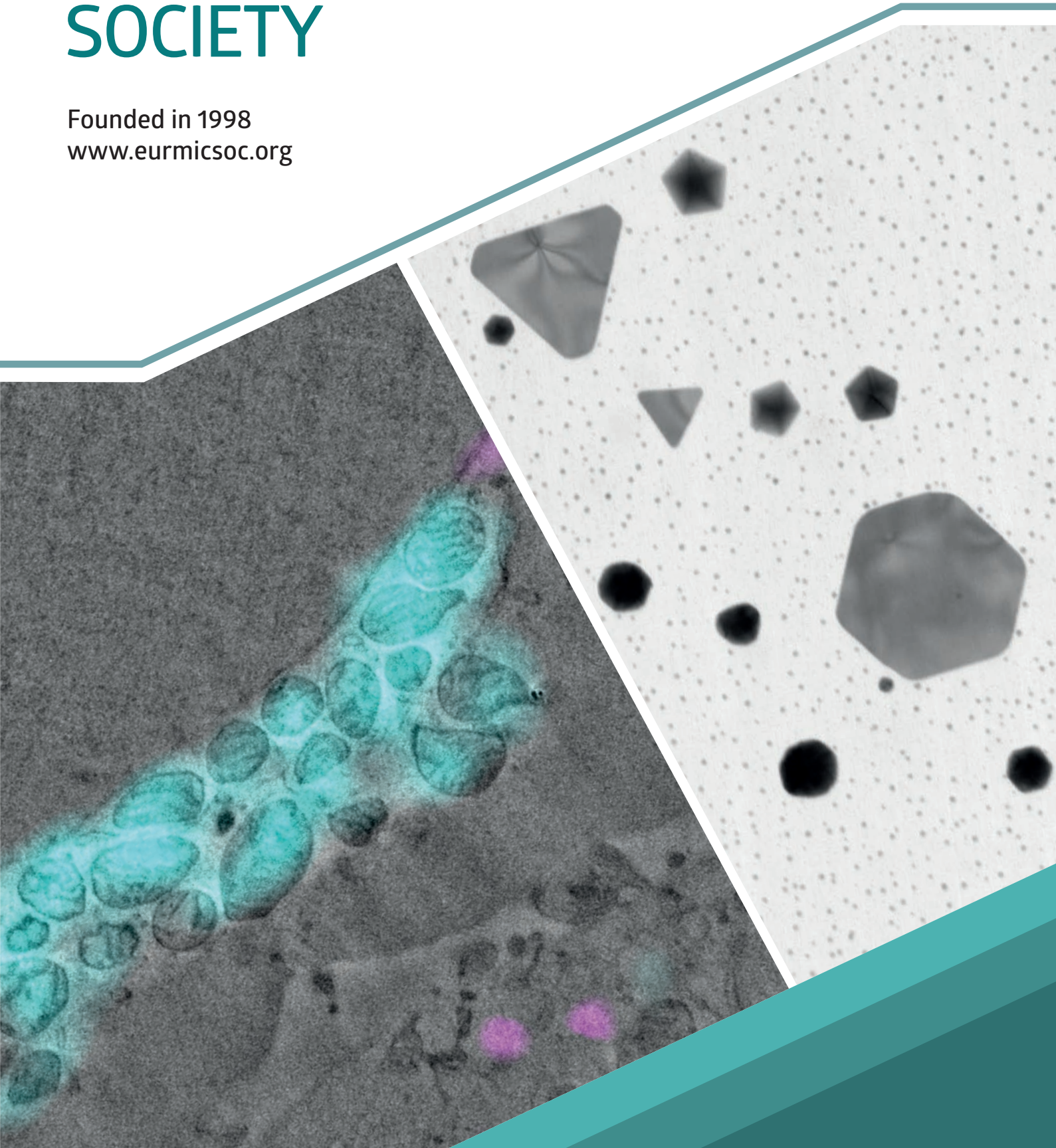
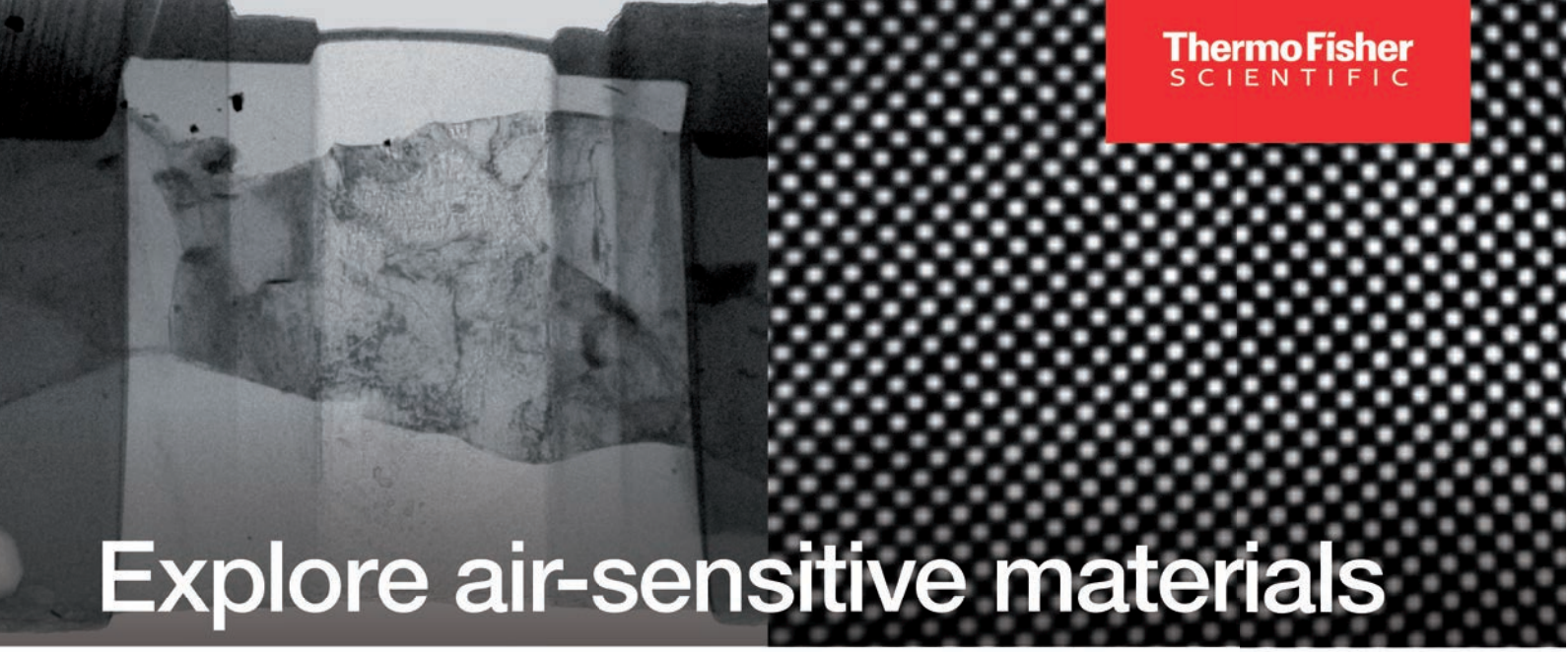
YEARBOOK 2023

EUROPEAN MICROSCOPY SOCIETY

25TH ANNIVERSARY
1998 2023 EUROPEAN MICROSCOPY SOCIETY

Founded in 1998
www.eurmicsoc.org



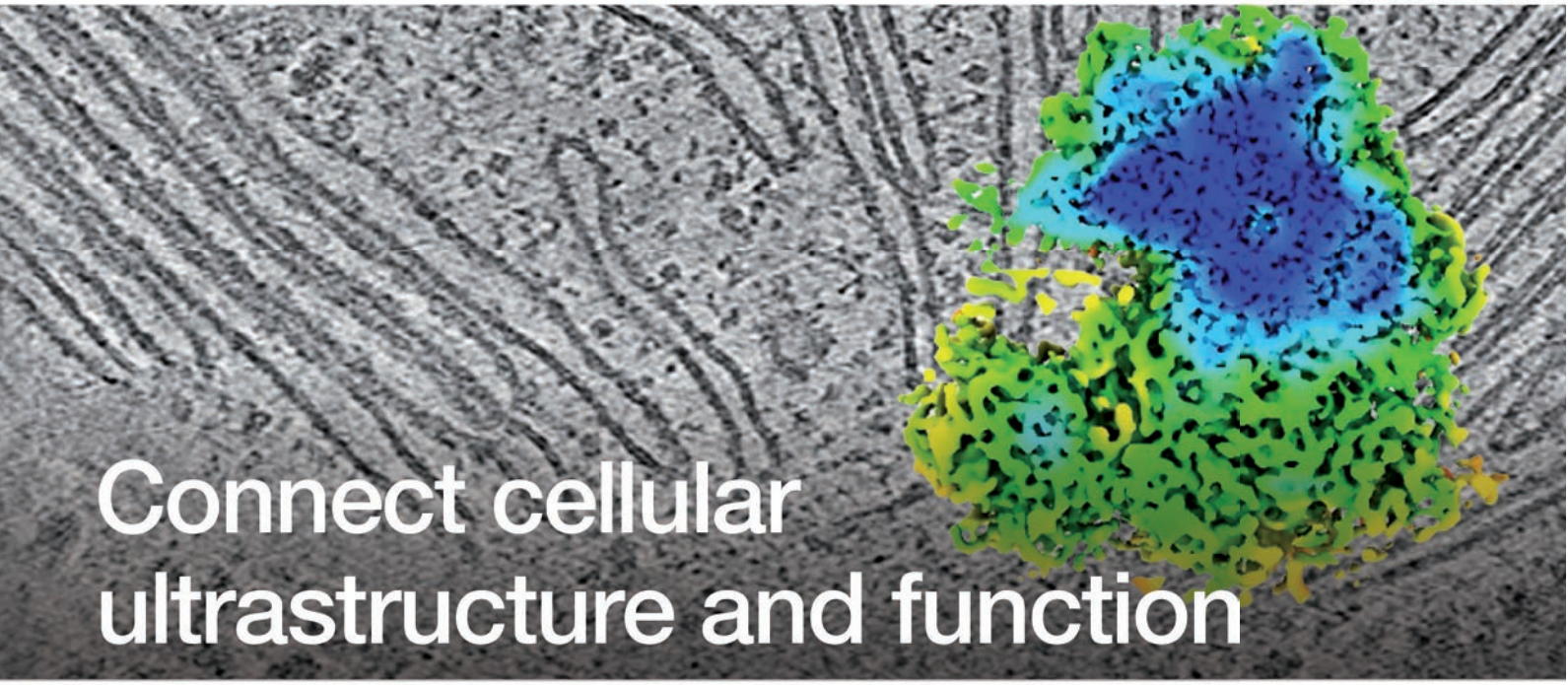


ThermoFisher SCIENTIFIC

Explore air-sensitive materials

Protect samples using the inert gas sample transfer workflow with Thermo Scientific™ DualBeam™ Instruments.

Learn more at **thermofisher.com/battery-research**



Connect cellular ultrastructure and function

Obtain structural information of cellular processes and pathways with Thermo Scientific™ cryo-FIB technology.

Learn more at **thermofisher.com/cryofib**

thermo scientific

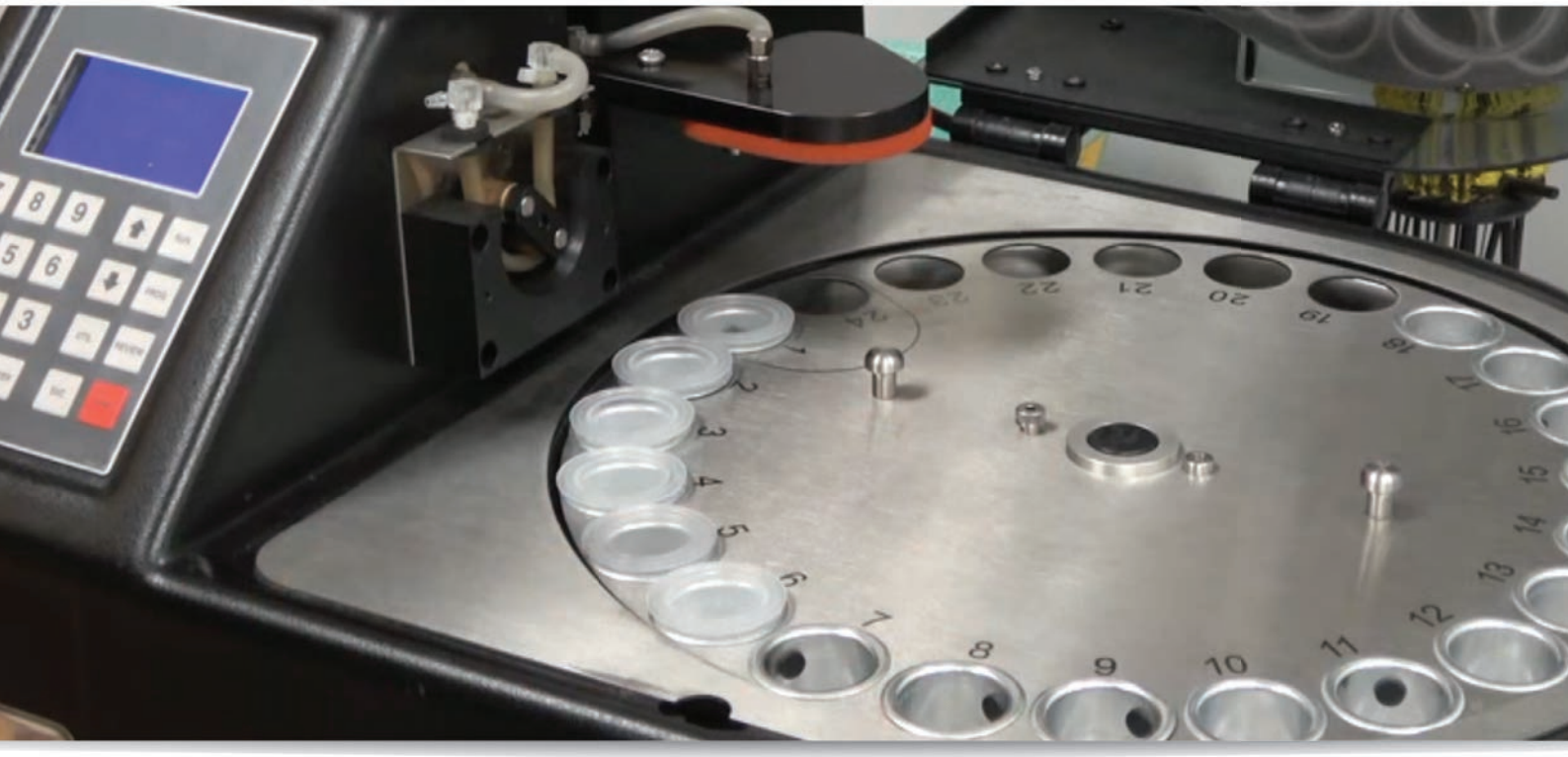
A unique batch-mode tissue-processing system

Electron Microscopy Sciences

Lynx II AUTOMATED TISSUE PROCESSORS FOR HISTOLOGY AND MICROSCOPY

Compatible with all plastic resins and paraffin waxes

The LYNX II from Electron Microscopy Sciences is a unique batch-mode tissue processor that holds 24 reagent vials for EM processing, or 12 larger reagent vials for Histology processing. The LYNX II has two independently controlled heating/cooling stations. Samples are mounted on a sample arm and reagents are loaded on a reagent carousel. Programs are controlled from a user-friendly interface. Based on the selection of agitation and vacuum, the LYNX II periodically moves the sample arm to provide agitation and applies vacuum when the agitation is not in progress. Once the programmed time in a given reagent is over, the sample is raised and the next reagent is rotated to the processing station. Additional features include internal battery backup and a fume control system.

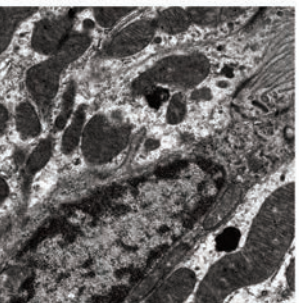
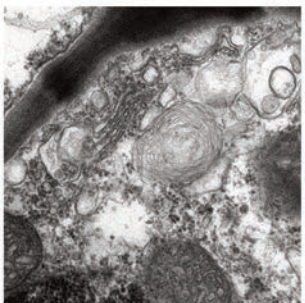
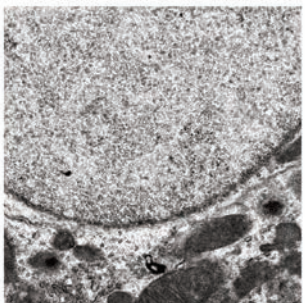
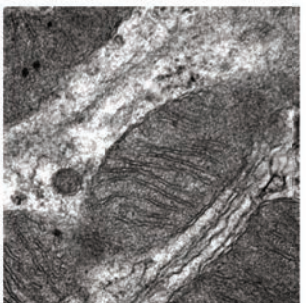
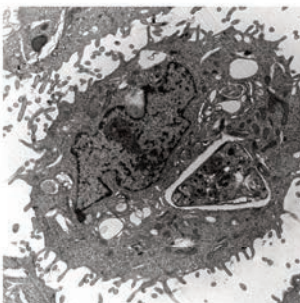


EMS has it!

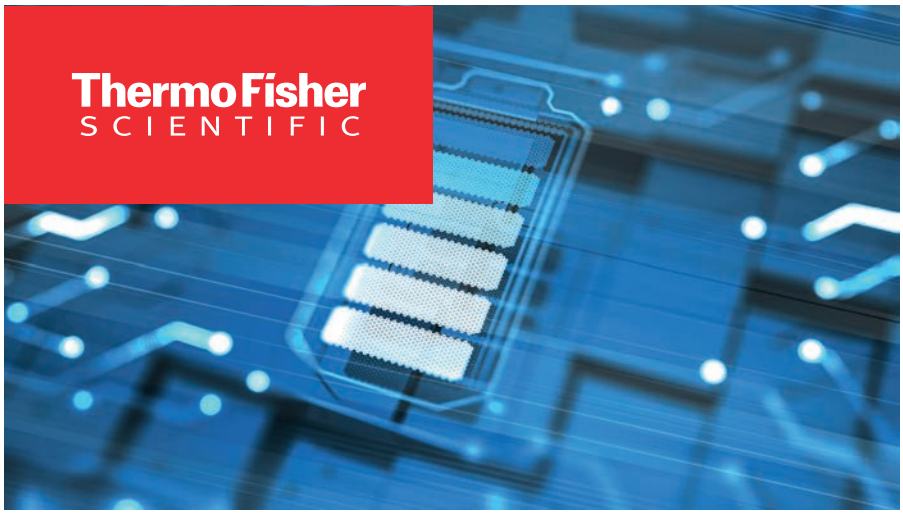
www.emsdiasum.com

P.O. Box 550 • 1560 Industry Rd.
Hatfield, Pa 19440
Tel: (215) 412-8400 • Fax: (215) 412-8450
email: info@emsdiasum.com
or stacie@ems-secure.com

- 12 reagent vials for HP processing, each 125 ml volume
- 24 reagent vials for EM processing, each 25 ml volume
- 10 Programs for EM and 10 programs for Histology
- Two independently controlled heating/cooling stations
- Easy replacement of reagent carousel
- Paraffin Processing
- Sample agitation
- Vacuum infiltration during processing
- Built-in fume extraction and ability to connect the discharge hose to lab exhaust system

PUSHING THE BOUNDARIES OF BATTERY RESEARCH AND STEPPING INTO THE UNEXPLORED WORLD OF AIR-SENSITIVE MATERIALS



The energy sector is one of the biggest sources of greenhouse gas emissions and holds the key to averting the worst effects of climate change. However, today's energy storage devices are limited by the performance of their constituent materials. With the ultimate goal to reduce the greenhouse emissions, material scientists and industrial researchers are accelerating the efforts to build better battery materials that will pave the path towards a clean-energy future. To get deeper understanding of the future requirements and to be able to design cheaper, more efficient, more flexible batteries, they need to build strong fundamental battery chemistry science.

Imaging techniques such as SEM, DualBeam and TEM are very helpful to study the 2D and 3D morphology of battery components at different stages in the lifecycle. These techniques cover the full-length scale from the cell level down to the atomic scale with TEM. Furthermore, 3D imaging is necessary to provide a complete geometric evolution of the electrode microstructure upon cycling.

A key element to battery material research – Sample preparation

Sample preparation for scanning/transmission electron microscopy (S/TEM) analysis is one of the most critical and time-consuming tasks in this multi-scale, multi-modal battery research workflow. An optimum sample preparation and sample transfer between various instruments without compromising sample integrity is crucial for any microscopic material analysis. Especially if the sample is air- and/or moisture-sensitive, like Lithium, can be an even more challenging process when analyzing it in its native state.

Introducing Thermo Scientific™ Inert Gas Sample Transfer (IGST) Workflow

To avoid degradation of sample, Thermo Scientific™ Inert Gas Sample Transfer (IGST) Workflow with the Thermo Scientific CleanConnect™ Samples Transfer System can be used to allow scientists to focus on their research on air-sensitive materials like lithium. Lithium requires additional care in handling to avoid any changes in its material properties due to air exposure when transferring in glove box. The CleanConnect sample transfer system, with its argon environment ensures that the sample is well protected during the transfer to the microscope. The ergonomic and modular design of CleanConnect enables uncomplicated sample handling without modification to the glove box.

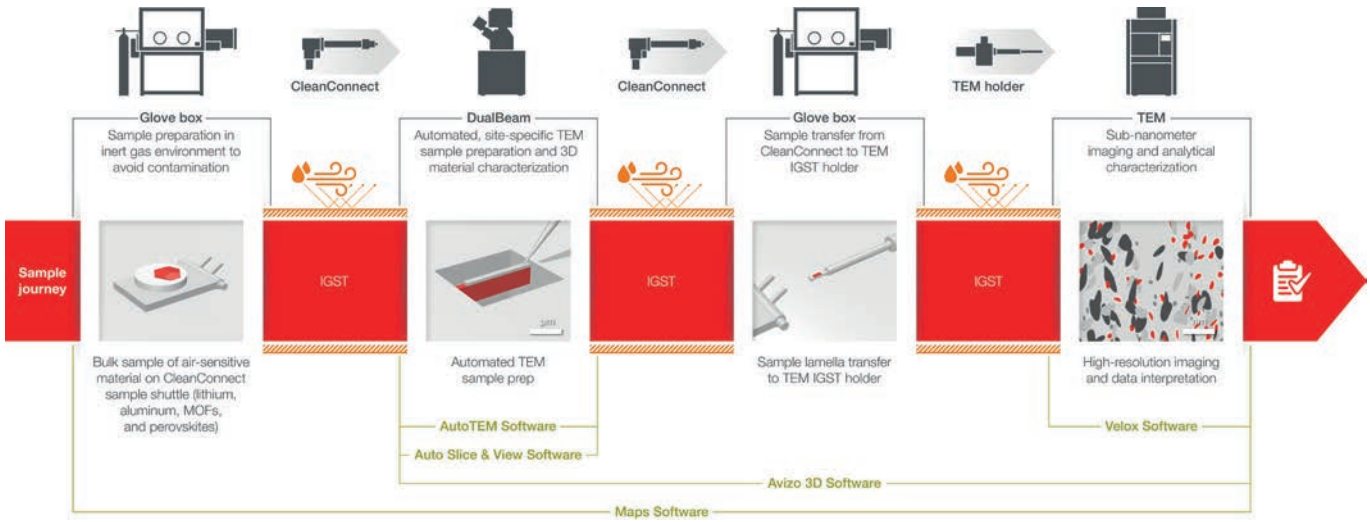
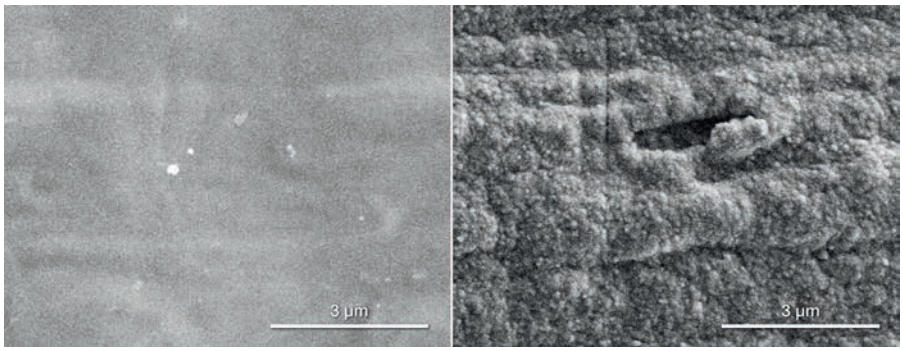


Figure 1 *Inert gas workflow for nanoscale analysis using Thermo Scientific DualBeam and TEM systems*



Figures 2 show a comparison of an inefficient sample transfer with its risk of lithium versus a seamless sample transfer to SEM using the CleanConnect System. Pristine lithium metal surface allows in-depth analysis of surface features. Without the CleanConnect System, the sample surface would be completely modified.

Figure 2 *Lithium transfer using the CleanConnect System (left) versus lithium transfer in air, ~2 minutes (right).*

Why is inert gas used in the workflow?

An inert gas is a gas that does not readily undergo chemical reactions with other chemical substances and therefore making the material characterization possible in its native state.

CleanMill: Providing high throughput, high quality surface preparation even on the most challenging samples

Often observation of battery components in a SEM requires special sample preparation more precise than traditional polishing techniques like grinding or mechanical polishing. The Thermo Scientific™ CleanMill™ is a complete ion polishing solution for battery SEM applications that enables optimal imaging and analytical characterization of beam and air sensitive materials where a pristine surface is required for accurate characterization. CleanMill is fully compatible with the Thermo Scientific IGST workflow and CleanConnect IGST for air sensitive samples.

Extending beyond advanced imaging with the right software

A holistic characterization of batteries and energy storage materials extends beyond advanced imaging. To understand and develop nextgen materials, researchers need to understand the structural and chemical composition of their sample and be able to easily visualize and analyze their data.

By combining analytical techniques such as microCT, SEM and TEM, DualBeam, Raman spectroscopy, XPS, live quantification (ChemiSEM Technology) and advanced 3D visualization and analysis software (Avizo), researchers can obtain the critical structural and chemical information they need to build better batteries.

With this multimodal information at multiple length scales, researchers can learn fundamental properties of the battery as it changes throughout its lifetime, leading to major breakthroughs in battery design. These details could range from how different components fail as the battery is used to how lithium migrates between electrodes.

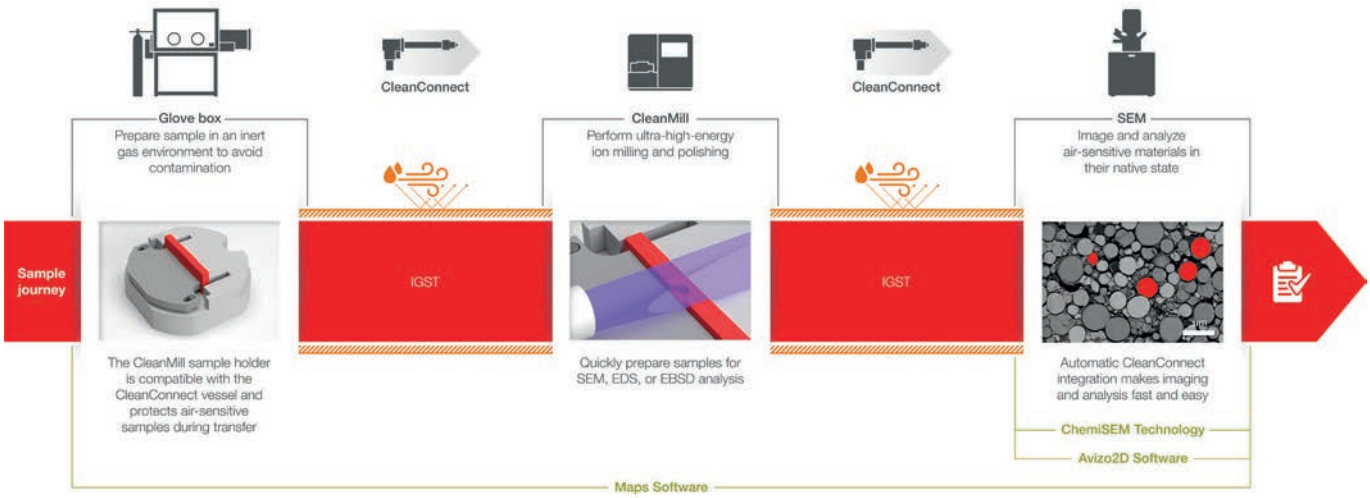


Figure 3 *Inert gas workflow for nanoscale analysis using Thermo Scientific CleanMill and SEM*

AUTOMATED SPECIMEN PREPARATION FOR TEM: **SEEDING ASTROCYTES ON COVERSLIPS**

Astrocytes are star-shaped glial cells which perform a variety of tasks involving neurogenesis, neuron growth, and neuron maintenance. Astrocytes also serve as intercellular structural support within the central nervous system and help transport nutrients to their associated neurons. Being able to routinely differentiate human pluripotent stem cells (hPSCs) into astrocytes allows researchers to examine their physiology. This is often accomplished by seeding onto glass coverslips in 24-well polystyrene culture plates.[1]

Optimizing the visualization of astrocytes

After chemical fixation for imaging by Transmission Electron Microscopy (TEM), two important questions must be addressed:

1) Are there detectable differences between phosphate or cacodylate buffer used during fixation?

2) Does post-fixation with osmium tetroxide or osmium tetroxide reduced with potassium ferrocyanide affect contrast with regard to membrane preservation?

It is crucial that initial TEM fixation and subsequent specimen preparation of cultured astrocytes be reliable and consistent in order to generate timely and reproducible experimental results. Conventional methods often involve numerous labor-intensive exchanges of liquid reagents between various containers and the possibility of damage to glass coverslips from excessive handling.

Comparing reagents via automated processing

TEM laboratory technicians might universally desire improved sample preparation protocols, but time and resource limitations often lead to the use of previously relied on methods. Head-to-head comparisons of potentially better performing reagents are very difficult using traditional manual techniques. However, simply and easily preparing multiple identical specimens to test various fixation and staining protocols is now possible using automated processing.

Shown below are TEM micrographs produced after using an EMS Prepmaster 5100 to compare various alternatives for preparing cultured cells on glass coverslips in the same polystyrene plate in which they were cultured.

Results

All combinations resulted in generally acceptable images (Images 1, 2, and 3). However, osmium reduced with potassium ferrocyanide, in both cacodylate buffer and phosphate buffer applications, appears to show greater membrane contrast, lower cytoplasmic background, and more easily discernable cytoskeletal elements (Image 4).

Membrane preservation, contrast, and ultrastructural details did not appear to be affected by the choice of phosphate buffer versus cacodylate buffer.

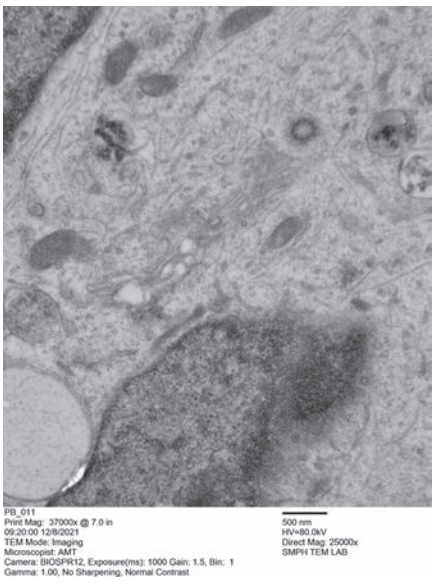


***Image 1**. (Phosphate buffer/Os04) Phosphate buffer combined with unreduced osmium tetroxide produces clearly identifiable Golgi and centrosome.*

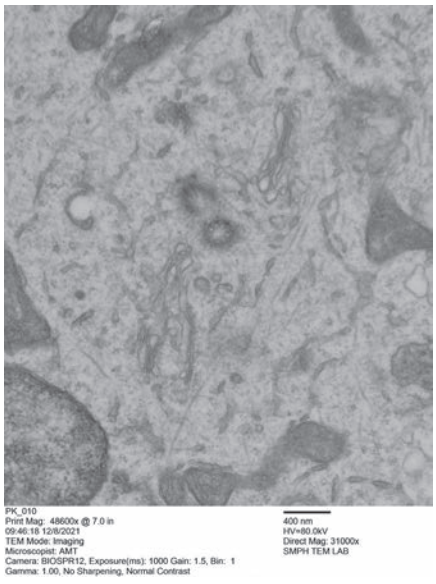


***Image 2**. (Phosphate buffer/Os04-KFC) Phosphate buffer with reduced osmium tetroxide gives low cytoplasmic background with well-defined centrosome and Golgi apparatus, including clear, well contrasted membrane preservation of the microtubules in the centriole.*

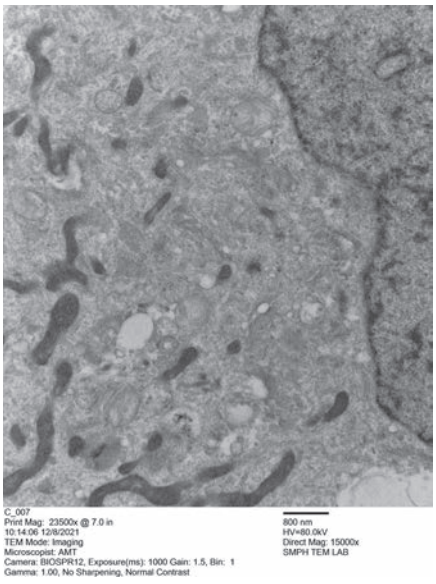


***Image 3**. (Cacodylate Buffer/Os04) Cacodylate buffer with unreduced osmium tetroxide shows Golgi apparatus however lack of clear and easily discernable membranes makes it difficult to resolve against the dense background cytoplasm.*

The EMS Prepmaster 5100 enabled easy and precise testing of 4 variables in one simple experiment using computer-controlled automated liquid handling. A complicated array of reagents was delivered to each individual sample properly and precisely. Human inaccuracy was eliminated. This revolutionary increase in performance is due to the Prepmaster 5100 having zero possibility of decision-making errors, plus liquid handling accuracy and precision unattainable by a human being.

Equipment: EMS Prepmaster 5100

Cells seeded on delicate and fragile coverslips are particularly difficult to prepare because of fear of breakage. The Prepmaster 5100 effortlessly prepares them quicky and safely for you so you can spend your valuable research time more effectively.

Advantages

- Effortlessly prepare cells seeded on coverslips up to ~12mm diameter
- Long protocols with 5 or more heavy metal steps, such as OTO, can be run safely overnight
- Example protocols included
- Your current manual workflow can be translated to this platform quickly and easily
- Remote viewing and operation via RealVNC included
- Easy to set up and easy to clean up

The Prepmaster 5100 ensures repeatability and reproducibility. It reliably accomplishes your dull, dangerous, repetitious, and error-prone tasks, increasing confidence in your results and freeing your time for more complex and interesting work.

Features

- Temperature controlled (5-95˚C) sample dock
- Prepares up to 24 coverslips per batch
- Up to 72 unique reagents or rinses
- Windows laptop computer control for fast, easy protocol creation and modification
- Limitless number of protocols can be stored
- Flat, low deck enables convenient in-hood installation or ventilated enclosure also available
- Expandable for future applications
- Compact footprint: 63x57x66cm / 25x23x26in (w,d,h) 48kg (106lb) 100-240VAC 50/60Hz

For more information about the EMS Prepmaster 5100, please visit **www.emsdiasum.com**

Electron Microscopy Sciences

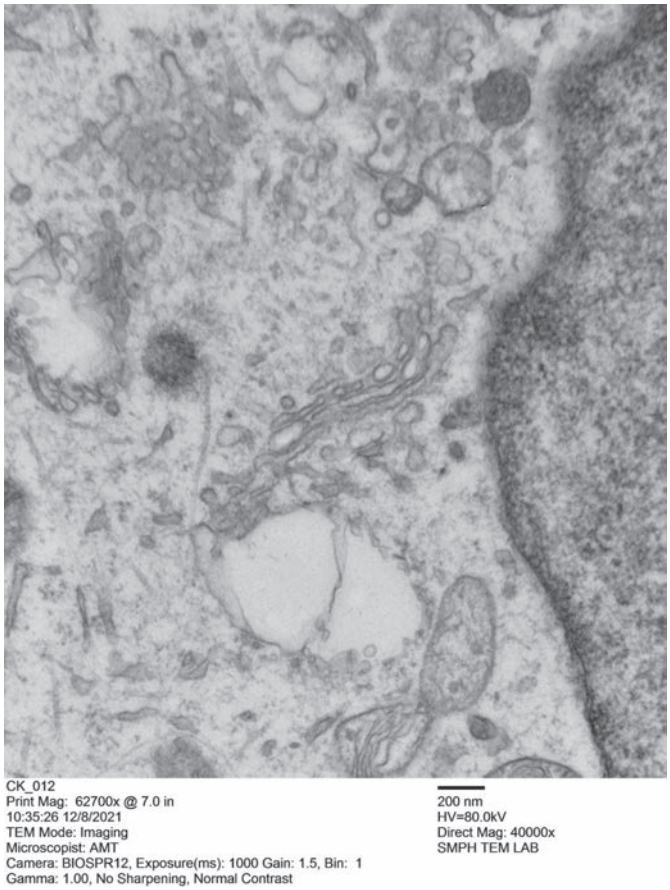
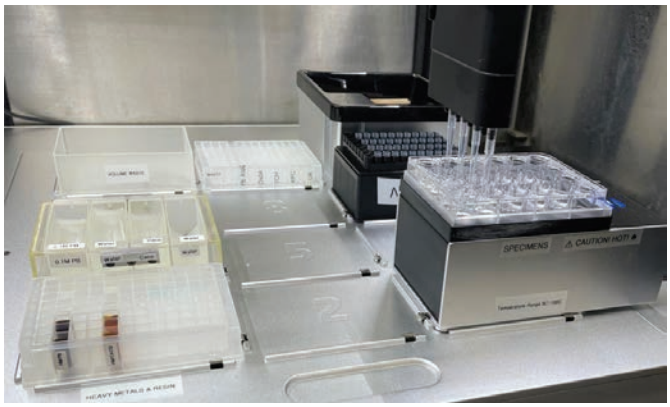


Image 4. (Cacodylate buffer/Os04-KFC) Cacodylate buffer with reduced osmium tetroxide shows beautifully preserved Golgi apparatus membranes, low cytoplasmic background, and easily visible microtubules.



Deck of the Prepmaster 5100. Note the darker color of the reduced osmium in the reservoir plate in the lower left corner.

References

1. https://www.waisman.wisc.edu/stem-cell-research-program/zhang-lab/

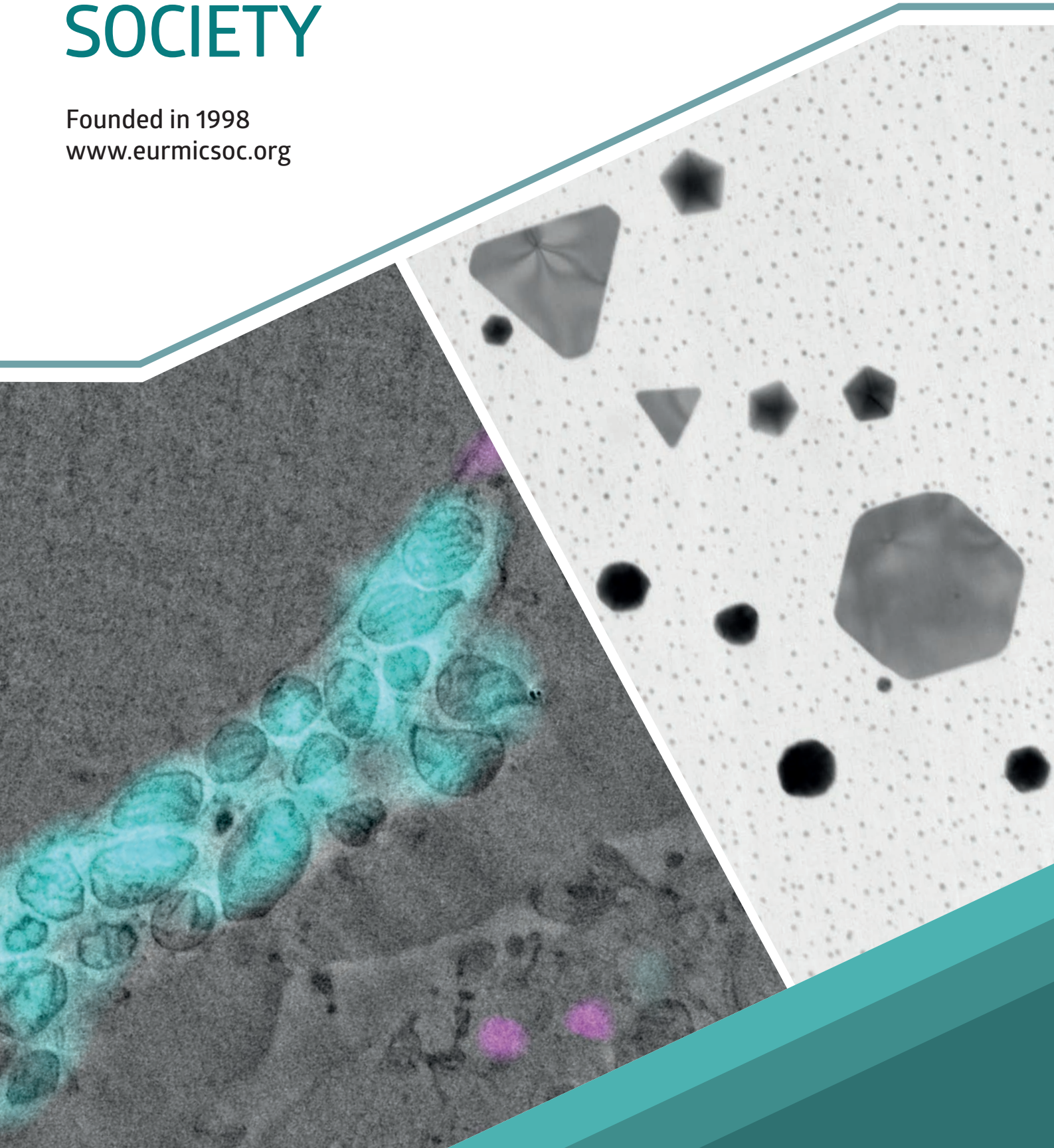
Notes

YEARBOOK 2023

EUROPEAN MICROSCOPY SOCIETY

25TH ANNIVERSARY
1998 2023 EUROPEAN MICROSCOPY SOCIETY

Founded in 1998
www.eurmicsoc.org



Notes

Preface

Dear EMS members,

It is always a great please to write this preface starting the yearbook. A pleasure to summarize what happened during the year. Undeniably, the year 2022 was rich for our community!

One deemed interest provided by EMS is the use of its platform for job announcements. In 2022, despite the delicate worldwide situation, we overtook the prevision and got a record with more than 165 announcements. Part of them has been satisfied thanks to EMS.

The facilities offered by EMS allows us to promote and diffuse to the microscopists the information about meetings, workshops and congresses. 58 announcements have been made in 2022 (compared to 48 in 2021…), coming back to the rhythm before the crisis!

EMS provides also funds for the organization of events (sponsored or extension events), or reversely to encourage the participation of young scientists to these events by offering scholarships. In 2022, the community had the chance to meet twice, at PICO 2022 and at MCM16, outstanding EMS extensions. Many thanks again to the very efficient organizers. Corresponding reports (extensions and scholarships) are available in this yearbook.

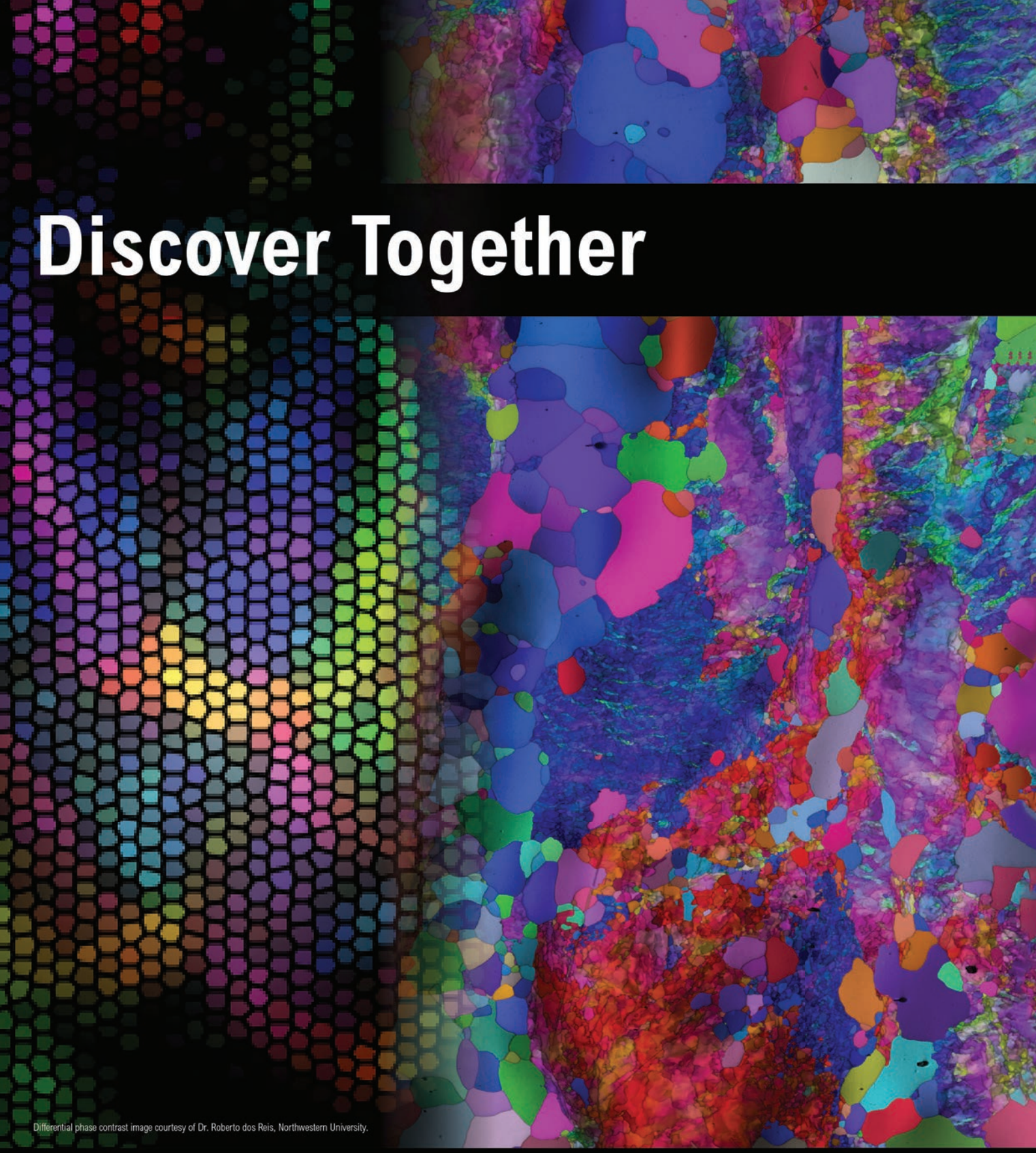
The executive committee met twice this year, in Bologna and at the MCM16 in Brno. The executive committee did a great job by - for example - updating the bylaws (look at *emsconstitution_2022-updated* (**eurmicsoc.org**)), voted on at the GA and also unanimously approved by the IFSM executive committee. One also significant new point is the free registration to EMS now available to retired scientists (those interested in). Precise information can be asked to our very efficient secretary Marina Vita from MCO at the **sec@eurmicsoc.org**.

This 2022 EMS yearbook is still printed and distributed by the ERI company, free of charge for our society. Special thanks to the firms advertised on its pages to support us.

Thanks to all our colleagues who have contributed to and helped proofreading this yearbook, in particular to Prof. Servet Turan, now fully competently invests to organize and handle the yearbook.

We look forward to new developments, announcements, and a fascinating time, in particular at Busan for the IMC20 congress of the IFSM.

Virginie Serin
EMS Secretary



Discover Together

Differential phase contrast image courtesy of Dr. Roberto dos Reis, Northwestern University.

For every researcher, there is that moment. That instant of discovery when a structure reveals itself. Or a reaction reframes how you think about a material's properties.By working with our customers to develop new approaches, we believe there are endless opportunities to explore the boundaries of electron microscopy and uncover new insights into your research.

Let's discover together how to achieve your next breakthrough.

GATAN / EDAX
AMETEK

Yearbook 2023 - Contents

Cover Design by

Dr. Sorour Semsari Parapari, Ljubljana, Slovenia (right, Materials Sciences)

Dr. Sergio Pipaón, Madrid, Spain (left, Life Sciences)

Executive Board

Prof. Dr. José Maria VALPUESTA

President

Centro Nacional de Biotecnologia (CNB-CSIC)
Darwin 3 - 28049 Madrid - Spain

Tel: +34 91 585 4690
eMail: jmv@cnb.csic.es
Website: http://www.cnb.csic.es/index.php/en/research/research-departments/macromolecular-structures/structure-and-function-of-molecular-chaperones

Prof. Dr. Josef ZWECK

Past-president

University of Regensburg - Physics Faculty - Electron Microscopy Laboratory
Universitaetsstrasse 31 - 93040 Regensburg - Germany

Tel: +49 941 943 2590
eMail: josef.zweck@ur.de
Website: http:/em.ur.de

Prof. Dr. Virginie SERIN

Secretary

CEMES - CNRS
Centre d'Élaboration de Matériaux et d'Études Structurales (UPR 8011)
29, rue Jeanne Marvig, BP 94347 - 31055 Toulouse Cedex 4 - France

Tel: (+33)-5- 62-25-78-67
eMail: sec@eurmicsoc.org
Website: http://www.cemes.fr

Prof. Dr. Christian SCHÖFER

Treasurer

Center for Anatomy & Cell Biology - Medical University of Vienna
Schwarzspanierstraße 17 - AT-1090 Vienna - Austria

Tel: (+43)14 0160 37713
eMail: christian.schoefer@meduniwien.ac.at
Website: http://www.univie.ac.at/nucdevbiol/

Prof. MD PhD Klaus QVORTRUP

EMC Chair 2024 / EMC Chair 2020, Cancelled

University of Copenhagen - Department of Biomedical Sciences
Microscopy Core Facility, CFIM
The Panum Institute, 3 Blegdamsvej - 2200 Copenhagen N - Denmark

Tel: +45 2875 7251
eMail: Qvortrup@sund.ku.dk
Website: www.cfim.ku.dk

Kornelia WEIDEMANN

ECMA Representative

Thermo Fisher Scientific - FEI Deutschland GmbH
Im Steingrund 4-6 - 63303 Dreieich - Germany

Tel: +49 151/14624522
eMail: kornelia.weidemann@thermofisher.com
Website: www.thermofisher.com

Prof. Dr. Cristiano ALBONETTI

Member

CNR - Istituto per lo Studio dei Materiali Nanostrutturati (ISMN)
Via Gobetti 101 - 40129 Bologna - Italy

Tel: +39 05 1639 8531
eMail: cristiano.albonetti@cnr.it

Lucy COLLINSON

Member

Head of Electron Microscopy - The Francis Crick Institute
1 Midland Road - London, NW1 1AT - United Kingdom

Tel: +44 20 37 96 18 05
eMail: lucy.collinson@crick.ac.uk

Prof. Dr. Randi HOLMESTAD

Member

NTNU - Department of Physics
Gløshaugen, (Høyskoleringen 5) - N-7491 Trondheim - Norway

Tel: (+47)-73 59 38 80
eMail: randi.holmestad@ntnu.no
Website: http://www.ntnu.edu/geminicentre/tem

Dr. Agnes KITTEL

Member

Hungarian Academy of Sciences - Institute of Experimental Medicine
Pf. 67 - 1450 Budapest - Hungary

Tel: +36 1 210 9977
eMail: kittel@koki.hu

Saso STURM

Member

Jozef Stefan Institute - Department for nanostructured materials
Jamova 39 - SI-1000 Ljubljana - Slovenia

Tel: +386 1 4773 418
eMail: saso.sturm@ijs.si

Prof. Dr. Servet TURAN

Member

Eskisehir Technical University - Materials Science and Engineering,
Tepebasi, 26555 - Eskisehir - Turkey

Tel: +90 (534) 684 55 55
eMail: servetturan26@gmail.com

Prof. Dr. Igor WEBER, PhD

Member

Ruder Boskovic Institute - Division of Molecular Biology
Bijenicka cesta 54 - 10000 Zagreb - Croatia

Tel: +385 1 457 1219
eMail: iweber@irb.hr

Letter from the President

Dear EMS members,

Let me greet you in the year in which our society celebrates its first twenty-five years of existence, a quarter of a century in which we have witnessed important technological developments in all types of microscopies covered by our society, some of which have had an enormous influence on other scientific disciplines. Two initiatives are underway to celebrate it: 1) the publication of a booklet with articles from EMS members, coordinated by our Past-President, Prof. Zweck, to whom I thank for his efforts; 2) a special symposium, which will take place during the 20th International Microscopy Congress (IMC20), to be held in Busan (Korea) from 15 to 20 September 2023. Another celebration, this time in Europe, will take place during our EMC congress of 2024 (see below).

The activity of our members is reflected once again in the yearbook that you have in your hands, in which you can find a comprehensive account of the events organised by the EMS regional societies and their members. During 2022, most of these activities (meetings, workshops, courses) have been on site, a proof of our return to normality after the ravages of COVID19. However, this problem and other changes in recent years have led the executive committee to suggest changes to our constitution and bylaws, which were proposed and approved at the general assembly in Brno last September, and recently endorsed by the IFSM. These changes have already been implemented and can be read on our web page.

One of the activities organised annually is the Outstanding Paper Awards (OPA) in the three disciplines (Materials Sciences, Life Sciences and Instrumentation and Technique Development), an activity coordinated by our board member Prof. Randi Holmestad. We thank her and the jury members for their work in choosing the best papers presented. The EMS secretary, Prof. Virginie Serin, has already provided information on these awards, and you will find more information in the yearbook.

A core aspect of EMS activities is the support given to meetings and workshops organised by EMS members, including scholarships for young scientists. You will find an extensive report on these events, which were funded thanks to our members and corporate sponsors. Special thanks to the latter for their continued support in all the activities, including the publication of this book, which reaches you free of charge.

The money used by the EMS for all the supported activities is in the hands of our able treasurer, Prof. Christian Schöfer, and you can check on these pages his report on the handling of EMS budget.

The organisation of the next EMC congress (from 26 to 30 August 2024, in Copenhagen) is underway, thanks to the efforts of SCANDEM and the organizing committee, headed by Prof. Qvortrup. We thank all the people involved in the organisation of this event.

I don't want to forget the efforts of the EMS Secretary Prof. Virginie Serin, of Prof. Servet Turan, and the EMS PCO liaison Marina Vita (MCO Congrès), for the coordination of this yearbook, which attempts to summarise the work done by the EMS members, more than 5,000 belonging to 24 national societies.

Finally, I cannot forget the work of my colleagues of the EMS executive board for their work and continuous support.

José M. Valpuesta
EMS President

Notes

EMC2024

Report 2024

August 25-30, 2024; Copenhagen, Denmark

Emc2024, the forthcoming European Microscopy Congress, is hosted by Scandem – The Nordic Microscopy Society – and will take place at The Bella Center, Copenhagen (Denmark) on August 25-30, 2024. Preparations are well underway both scientifically and locally.

emc2024 will be a physical conference only, with 6-7 parallel scientific sessions embedding 3 major symposia: Life Science, Physical Science, and Instrumentation & Methodologies headed by Eija Jokitalo (Helsinki, FI); Jakob Birkedal Wagner (Copenhagen, DK); Julia Fernandez-Rodriguez (Gothenburg, SE); and Randi Holmestad (Trondheim, NO), respectively.

Five distinguished scientists have already confirmed a plenary presentation: Carolynn Larabell (University of California, San Francisco, US), Emma Lundberg (SciLifeLab, SE), Vincenzo Grillo (CNRNano, IT), Claus Ropers (University of Göttingen, DE), and Moritz Helmstaedter (Max Planck Institute for Brain Research, DE), respectively. The opening address of emc2024 will be presented by Eva Olsson (Chalmers, SE).

Scientific topics for the emc2024 will – among many others – be in the fields of label-free and correlative imaging; volume electron microscopy; cryoEM; nanoparticles and catalysts; magnetic, ferroelectric, and spintronic materials; super-resolution microscopy; phase microscopy, and new instrumentation, where we see an increasing amount of new and exciting research and results. All 42 session topics are available at **www.emc2024.eu.**

The emc exhibitions typically attract well over 100 exhibitors, ranging from small start-up companies to the industry giants. This makes it a great opportunity to compare the latest products from different suppliers with many product demonstrations available. Company teams on hand will offer advice for any challenges you may have in the lab and answer any questions you may have.

Set to be the largest of its kind in Europe, the emc2024 exhibition will also offer a number of free commercial training workshops throughout the hall with focus on the latest equipment and software. The workshops will be presented by industry experts offering you trouble-shooting tips and handy tricks you can take back to your workplace. Prior to the conference, on Sunday August 25th, a number of pre-conference workshops will be offered, particularly aimed at young scientists and technicians.

The exhibition at emc2024 – encompassing an area of approximately 2,200 m² – will be the central hub for

Courtesy of Daniel Rasmussen and Copenhagen Media Center

Courtesy of Daniel Rasmussen and Copenhagen Media Center

the entire event, including the plenary lecture theater, 5-6 break-away lecture theatres, posters, workshops, and catering. It will provide an outstanding opportunity for networking for both delegates and exhibitors. Of the 90 exhibitors who had already committed to a booth at the exhibition in 2020, 70% has indicated continued commitment or expressed interest pending the publication of the Sponsorship & Exhibitor Prospectus, which can now be downloaded from the emc2024 homepage.

As one of the leading conferences in the field of microscopy we invite sponsors and exhibitors to show their commitment to and engage in a more sustainable congress by matching their choices and actions with their organization's values and strategies. The congress itself will lead the way by making more sustainable choices when it comes to e.g. food and transportation.

Please visit **www.emc2024.eu** for more information and updates or follow us on LinkedIn (**www.linkedin.com/company/emc-2024/**).

In 2022, we also saw a change in PCO organization. Accordingly, emc2024 is now organized by MCI Copenhagen under the auspices of the European Microscopy Society (EMS) and the International Federation of Societies for Microscopy (IFSM). On behalf of all of these societies and the Organizing Committee, I look forward to welcoming you to Copenhagen for what promises to be a real great event. ■

Professor Klaus Qvortrup
Conference chair

Courtesy of Daniel Rasmussen and Copenhagen Media Center

Courtesy of Daniel Rasmussen and Copenhagen Media Center

Notes

Reports on EMS extension

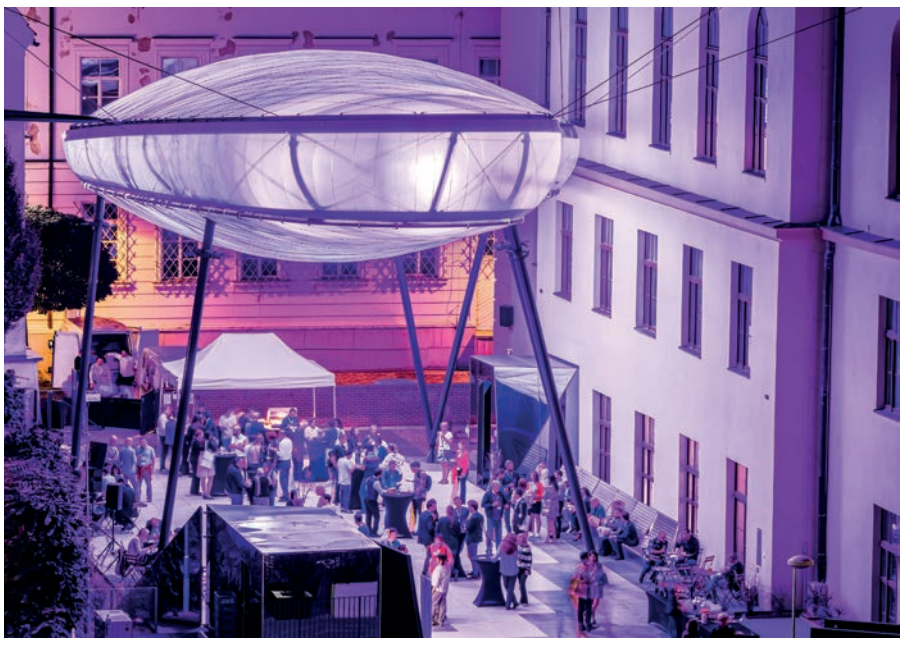
16th Multinational Congress on Microscopy (16MCM)

4-9 September, 2022; Brno, Czech Republic

The Czechoslovak Microscopy Society (CSMS) grabbed at the opportunity to host 16th Multinational Congress on Microscopy (16MCM). Due to extraordinary circumstances, the congress was held already on September 4th–9th 2022 in Brno, the Czech Republic, a year earlier than the usual date.

We suggested Brno, a beautiful city in Central Europe with famous history located in the southeastern part of the Czech Republic, as a great venue for international congresses. The Best Western Premier Hotel International Brno, equipped with lecture halls, meeting rooms and convenient space for exhibitions as the head-quarter of the conference in combination with the Museum of Applied Art, which served as a venue for the poster session and a part of the company exhibition, proved to be a great success as the venue of choice.

The South Moravian metropolis is an ideal place for electron microscopy events not only because of its long tradition in the development and production of microscopic instruments, but also thanks to the numerous universities and research centers performing great science, usually in close connection with microscopic companies. "Our wish was to introduce the unique, direct and intensive network of collaborations between the commercial sphere and academia that has resulted in a successful electron microscopic ecosystem to the audience through workshops and excursions", commented Vladislav Krzyžánek, Congress Chair. The ecosystem was presented with an interesting accompanying program. Three workshops organized in cooperation with the Czech Academy of Sciences were held on September 4th before the official opening of the congress, the well-moderated panel discussion on 8th of September invited three plenary speakers (Richard Henderson, Ute Kaiser and Quentin Ramasse) and representatives of platinum sponsors (Petr Střelec, Thermo Fisher Scientific, and Jaroslav Klíma, Tescan) to debate. In addition, an exhibition of microscopic images - "Microscopic gallery – the best of 16MCM in Brno" was held on the square in the center of Brno and presented the 27 best pictures, where the public had also the opportunity to vote for the best image.



16MCM received the support of EMS, which was proudly indicated on the 16MCM website: EMS Extension 2022. "The mission of the EMS is to support the organization of microscopy related events in Europe. At present this support includes financial sponsoring to cover the costs of two invited lecturers or assistance in electronic distribution of information about the meeting.", confirmed José Maria Valpuesta, President of EMS. We did not hesitate to invite several excellent world-renowned scientists, including the Scottish molecular biologist and biophysicist, Nobel Prize winner in chemistry Richard Henderson, as well as Ute Kaiser, Quentin Ramasse, Attila Losonczy, Lukáš Palatinus and Radim Chmelík and were lucky that all of them accepted the invitation right away. Moreover, Lukáš Palatinus and Radim Chmelík received CSMS awards for significant merits in the development of microscopic methods on the occasion of the congress.

Participants could enjoy a rich scientific program within three parallel sessions (Life Sciences, Material Sciences, Instrumentation and Techniques), accompanied by a unique opportunity to visit 26 company exhibitors producing the latest microscopic technology. "The aim of the event was to bring together academic scientists, researchers, students and

representatives of the commercial sphere to exchange and share experience and research results on all aspects of microscopy," remarked Vladislav Krzyžánek.

The professional part of the congress was complemented by a pleasant social program with opportunities to meet and learn about the beauties of Brno. Vibrant atmosphere of the Welcome reception located in the Museum of Applied Art stimulated less formal personal meetings and collaborations after the series of COVID online meetings. On Thursday 8th of September, we could take on the challenge and join the Charity run/walk to Špilberk Castle and enjoy the unrepeatable views of the whole city. In connection with this event, we helped by donating to ParaCENTRUM Fenix, an organization which helps people who survive a spinal cord injury. The festive atmosphere of the Farewell dinner at the Passage Hotel was underlined by the Closing ceremony, where together 9 the Best Posters Awards were announced. The winners of the best posters together with the winners of the best microscopic micrographs took their diplomas and prizes on this occasion.

At the conclusion of the congress, local research centers and Brno-based microscopic companies Thermo Fisher Scientific, TESCAN and Delong Instruments opened the doors to laboratories, where participants could try working on the best microscopes in the world and take a look into the production facilities.

16MCM in Brno was attended by the largest number of participants so far, more than 650 (including 500 scientists). "Despite the fears of this complicated time, we had a record turnout," confirmed Kamila Hrubanová, Congress Secretary. Attendees arrived even from Africa (1), North and South America (2) and 26 from Asia.

On behalf of the organizing committee, we hope you enjoyed 16MCM in Brno and could add our meeting to your favorite list. Thank you all for visiting our conference and making it scientifically valuable and socially rich.

See you all at the next MCM meeting in 2025. ■

Vladislav Krzyžánek,
Congress Chair & CSMS president
Ilona Müllerová, Co-chair for Instrumentation and Methods
Pavel Hozák, Co-chair for Life Sciences
Miroslav Šlouf, Co-chair for Material Science

More information:

info@16mcm.cz
https://www.16mcm.cz/

Seventh Conference on Frontiers of Aberration Corrected Electron Microscopy (PICO 2022)

8-12 May 2022; Kasteel Vaalsbroek NL

After a Corona-related break and an online version of the meeting, the Seventh Conference on Frontiers of Aberration Corrected Electron Microscopy, was held in spring 2022 as an in-person event at Kasteel Vaalsbroek in the Netherlands near Aachen. In the meeting, we addressed recent advances in methods and applications for the study of solids in condensed matter research and the life sciences by the application of advanced electron microscopy techniques. Furthermore, we celebrated the 25th anniversary of the function and publication of the first aberration-corrected transmission electron microscope.

PICO 2022 was organised by the Ernst Ruska-Centre, a national infrastructure jointly operated by Forschungszentrum Jülich and RWTH Aachen University. Furthermore, the conference was supported by the European Microscopy Society (EMS) as an EMS extension meeting and the EMS best paper award ceremony was part of PICO 2022. The conference has attracted more than 190 participants from 25 countries throughout the world and the programme committee has put together an oral programme including 55 scientific keynote lectures. Because of travel restrictions, some of the keynote lectures had to be given in an online or prerecorded version. The evenings were filled by two poster sessions with many young researchers who presented their results.

In the opening session of the PICO conference on Sunday afternoon, the EMS Outstanding Paper Award Ceremony was held. The ceremony was chaired by the EMS board member Prof. Randi Holmestad and the three awardees gave a lecture summarizing the results of their papers.

The awards were given in three categories:

1. **Instrumentation and Technique Development**
   Emma Silvester, University of Oxford (UK)
2. **Life Science**
   Rhian Jones, Aix-Marseille Université (France)
3. **Materials Science**
   Daniel Wolf and Sebastian Schneider, Leibniz Institute for Solid State and Materials Research (Germany)

The scientific programme of PICO 2022 contained a wide range of presentations focusing on recent advances in methods and applications for the study of structural and

electronic properties of condensed matter by the application of advanced transmission electron microscopy techniques in solid state research and the life sciences. Topical issues of aberration corrected electron microscopy research on (1) advanced methods and instrumentation, (2) materials science applications, (3) dynamic phenomena and in-situ techniques, (4) cryo microscopy methods and applications, as well as (5) novel techniques and approaches were highlighted in keynote presentations given by leading invited experts.

The Wednesday programme of PICO 2022 was dedicated to the celebration of the 25th anniversary of aberration correction in electron microscopy. Knut Urban organized an exciting programme for this day and he gave an overview highlighting the developments and the contributions of the four pioneers Harald Rose, Max Haider, Ondrej Krivanek and himself. Nine lectures highlighted recent achievements in physical sciences, materials science and life science including high-resolution TEM and STEM applications, theory and modelling, in situ-experiments and the application of aberration correction in life science.

The organisers gratefully acknowledge support by Thermo Fisher Scientific, JEOL, AMETEK, Hitachi High-Tech Europe, CEOS, DECTRIS, Quantum Detectors, NanoMEGAS and EMSIS, condenZero, Quantifoil Micro Tools, DENSsolutions, and Protochips. ■

Joachim Mayer

Further information:

https://er-c.org/index.php/conferences/pico-2022/

Notes

Reports on EMS sponsored events

Advanced Workshop on Cryo-Electron Tomography

7-13 May, 2022; Vienna, Austria

Originally planned for 2021 the Covid-19 pandemic forced rescheduling, but from May 7 to 13, 2022 eighteen participants finally came together in Vienna, Austria to attend the Advanced Workshop on Cryo-Electron Tomography. This weeklong, in-person course followed an ambitious scientific program combining theoretical lectures with hands-on practicals at the lab, microscope and computer room to go through all steps important for advanced cryo-electron tomography: from cryo sample preparation to tilt series acquisition via Serial-EM, to tomogram reconstruction and visualization with IMOD to finally sub-tomogram averaging with PEET. This generated a lot of food for thought to be discussed at the multiple networking and social activities in the evenings.

The workshop was jointly organised by the Electron Microscopy Facility of the Vienna Biocenter Core Facilities GmbH (VBCF), Nexperion e.U. – Solutions for Electron Microscopy and the Schur lab at the Institute of Science and Technology Austria (ISTA) in Klosterneuburg. Three times oversubscribed, the organisers faced a tough choice to select the final 18 international participants from Austria, Canada, Czech Republic, France, Germany, Italy, Romania, Spain, Sweden, Switzerland, The Netherlands, UK and USA.

Financial support by the European Microscopy Society as well as sponsoring by Amsterdam Scientific Instruments, Alvéole, Delmic, Diatome, Gatan-Ametek, JEOL, Leica Microsystems, Quantifoil, Sciences Services, Thermo Fisher Scientific and TVIPS helped the organisers to put together a renowned team of expert instructors including Helmut Gnaegi (Diatome, Switzerland), Sharon Grayer Wolf (Weizmann Institute, Israel), Wim Hagen (EMBL Heidelberg, Germany), David Mastronarde (University of Colorado Boulder, USA), Christiane Riedel (University of Veterinary Medicine, Austria) and Tommaso Costanzo, Florian Fäßler, Bettina Zens (ISTA, Austria) as well as several sponsored guest lecturers. ■

Thomas Heuser (VBCF-EM Facility), Günter Resch (Nexperion) and Florian Schur (ISTA)

EBEAM2022: School on Nano-optics with Free Electrons 2022

11-16 September 2022; Porquerolles, France

Electron optics and spectroscopy instrumentation developments in the last 20 years have considerably widened the range of applicability of electron beam techniques to nano-optics: meV beam energy spread, single atoms imaging capabilities, electron wavefunction shaping, fs pump probe experiments, and efficient light coupling to and from samples are a reality. This has enabled the study of a variety of excitations (plasmons, phonons, excitons...) at extreme spatial, temporal and spectral resolutions. Therefore, new theories have blossomed to explain exciting results coming from electron energy-loss spectroscopy (EELS), cathodoluminescence (CL) and photon induced near-filed electron microscopy (PINEM), and central concepts of nano-optics or quantum optics have been shown to be applicable to electron-based spectroscopies.

For this reason, it was high time for a school aiming at spreading knowledge about these new concepts and techniques and at fomenting the interest of a new generation of academics in this blooming field. That was the objective of the eBEAM school focused on electron spectroscopies for nano-optics. It is our belief that this objective was reached.

In a relaxed atmosphere at Porquerolles, France ***(Figure 1)***, the eight proposed courses took place joining the experience of well-established figures in our community to the energy and new insights of young scientist ***(Figure 2)***. The idea was to mix the expertise from relatively separated communities, should they be classified by scientific fields photonics, material science, quantum optics, quantum materials, instrumentation... or by the techniques they used (EELS, cathodoluminescence, PINEM, TEM or SEM, imaging or diffraction, etc.). We had the chance that our lecturers made an amazing work at introducing a dense programme:

The first day was dedicated to basics of electron microscopy. Pieter Kruit started with EM instrumentation, and Gerald Kothleitner followed with a survey of the main imaging and spectroscopy techniques. On Tuesday, we entered the core of the school's topic with Andrea Kocneca and Sean Collins. Andrea presented the photonics excitations (plasmons and phonon polaritons for example), and how they could be measured in EELS and CL. Sean had to present the other types of optical

Figure 1: group photo of the first eBEAM school on nano-optics with free electrons. Don't mind the shark.

excitations, namely those arising in optical materials (excitons…), and how they could be measured. The next day start with Hugo Lourenço-Martins, that discussed on time coherence and time resolved experiments (PINEM, time resolved CL, time-correlated experiments…), leaving everyone enjoy the Island in the afternoon. The lectures came back on Thursday with Axel discussing counterpart of Hugo, namely spatial coherence and experiments such as inelastic holography or EELS experiments with phase plates.

We take this opportunity to thank (and congratulate!) them again.

The topics chosen resonated well with participants and it is the feeling of the organizers that it might be time to edit a book, compiling the lectures, possibly with some additions. Such text still does not exist in our community and will surely be helpful to newcomers, from young PhD candidates to researchers entering the field of nano-optics with free electrons.

Finally, already during the school participants were inquiring about the next school edition. This is to be decided, but given the impetus, it shouldn't be later than 2024.

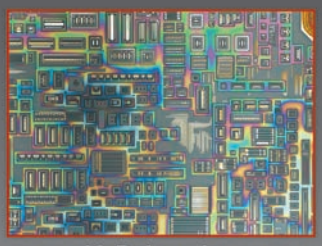
We want to warmly thanks all our sponsors: the EBEAM FET-OPEN project, the Sfμ and EMS, and our laboratory (LPS) for the academics. We got strong support from industrial partners: ThermoFischer, NION, Quantum Detectors, Delmic, Attolight, JEOL and Euclids labs. ■

Figure 2: Keeping with the school "young-spirit" Andrea Konečná (Brno University of Technology, Czech Republic) and Hugo Lourenço-Martins (CEMES-Toulouse, France) presents their lectures.

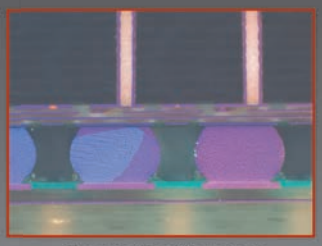
The MultiPrep™ System

The **MultiPrep™ System** enables precise semiautomatic sample preparation of a wide range of materials for microscopic (optical, SEM, FIB, TEM, AFM, etc.) evaluation. Capabilities include parallel polishing, angle polishing, site-specific polishing or any combination thereof. It provides reproducible sample results by eliminating inconsistencies between users, regardless of their skill.

Common applications include parallel circuit delayering, cross-sectioning, substrate thinning, serial/3-D preparation, wedge polishing and more.

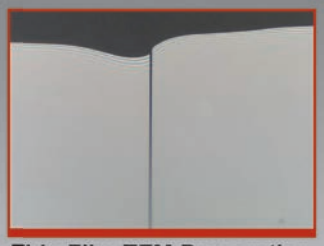


IC Delayering



Cross-Sectioning

EBSD Preparation

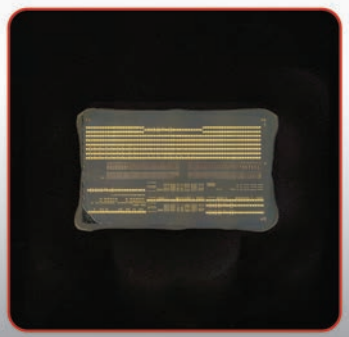


Thin Film TEM Preparation

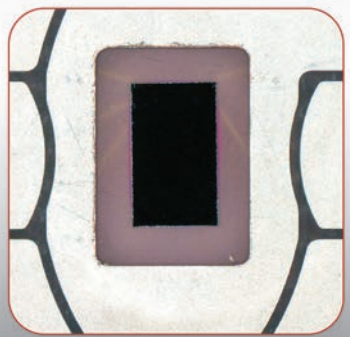
Unequalled Sample Preparation Results

The X-Prep®

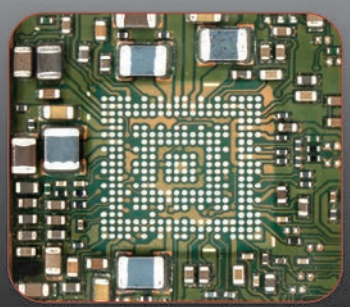
The **X-Prep®** is a specialized 5-axis CNC-based milling/grinding/polishing machine designed to support electrical and physical failure analysis techniques and other applications requiring high precision sample preparation.



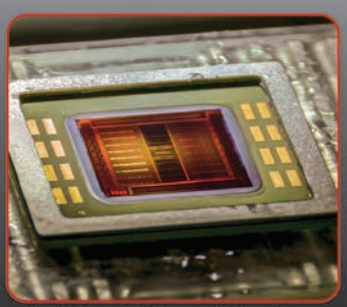
TSV Exposure



Smart Card Security Chip Exposure



Mobile Phone Chip-Off Component Removal



Uniform silicon thinning to less than 2 µm

ALLIED HIGH TECH PRODUCTS, INC.

Rancho Dominguez, CA 90220
info@alliedhightech.com
www.alliedhightech.com

The Green and Cultural Note

This informative note fights against the preconceived ideas of paper use and its environmental impact.

ECO RESPONSIBILITY — ECO RESPONSIBILITY —

Did you know?

Sources : ADEME - Greenliving National Geographic - EVEA Conseil - Digital power group - Cepi Sustainable Report - IDEP - FAO - WWF

500,000 ha in 10 years

In France, the forest has gained nearly 500,000 hectares (the equivalent of a department like the Bouches du Rhône) over the last 10 years.

1 invoice = 15 invoices

One invoice sent by internet releases 242 grams of CO_2, which represents the production and sending of 15 invoices in paper format.

1 page = 3 minutes on

The display of a page on a screen for 3 minutes uses more energy than the production of its printed version.

+30% of Europan forests

The area occupied by European forests has increased by more than 30% since 1950, which represents about 5 times the area of Paris.

99% of the wood in Europe is sustainably managed

99% of the wood used for paper production in Europe comes from sustainably managed forests.

vs

A person uses an average of 212 kg of wood per year, i.e. 500 Kw/h of energy consumption, while a traditional computer uses an average of 800 Kw/h over the same period.

Agence ERI
La communication 360

Tel. : +33 (0)1 55 12 31 20
Email : contact@eri-editions.com
www.eri-editions.com

163 avenue Charles de Gaulle
92200 Neuilly-sur-Seine - France

Electron Microscopy of Nanostructures (ELMINA2022)

22-26 August 2022, Belgrade, Serbia

ELMINA2022 was organized by: Serbian Academy of Sciences and Arts (SASA) and Faculty of Technology and metallurgy (FTM), University of Belgrade, Serbia and held at SASA, Student Square 1, 11000 Belgrade, Serbia, from 22.8.2022. to 26.8.2022. The conference was opened by: Professor dr Velimir Radmilović, SASA member and ELMINA2022 Conference chair, Professor dr Zoran Knežević, SASA General Secretary, Professor dr Robert Sinclair, ELMINA2022 International Advisory Board Chair and assistant Professor dr Vuk Radmilović, ELMINA2022 Conference manager. Number of participants at ELMINA2022 was 118, out of which 90 were presenting authors. The program consisted of eight (8) plenary, five (5) oral and two (2) poster sessions. Twenty-three (23) plenary talks were given by some of the most renowned world experts in the field of theory and application of electron microscopy in characterization of nanostructures, including:

Jordi Arbiol (Spain), **Gerhard Dehm** (Germany), **Rafal Dunin-Borkowski** (Germany), **Rolf Erni** (Switzerland), **Paulo Ferreira** (Portugal & USA), **Hamish Fraser** (USA), **Cecile Hebert** (Switzerland), **Colin Humphreyes** (UK), **Thomas Kelly** (USA), **Angus Kirkland** (UK), **Gerald Kothleitner** (Austria), **Vlado Lazarov** (UK), **Ivan Lazić** (Netherlands), **Laurence Marks** (USA), **Joachim Mayer** (Germany), **Peter Nellist** (UK), **Eva Olsson** (Sweden), **Xiaoquing Pan** (USA), **Quentin Ramasse** (UK), **Christina Scheu** (Germany), **Robert Sinclair** (USA), **Erdmann Spiecker** (Germany), **Sašo Šturm** (Slovenia).

Additionally, forty-one (41) poster was presented. It is noteworthy that most posters were presented by master and PhD students as well as young researchers.

Based on the quality of plenary talks and poster presentations as well as the fact that the conference was attended by a large number of young researchers (more than 70), most of who were from Serbia, it was concluded that the ELMINA2022 conference was very successful. It was also concluded that, due to interest from young researchers as well as plenary speaker suggestions, ELMINA should continue as a biennial event in Belgrade, Serbia, with the next ELMINA2024 being held from 9.9.2024. to 13.9.2024.

We would like to take this opportunity to thank first and foremost ThermoFisher Scientific as well as NanoMegas, JEOL/Scan LLC, Institute for Materials Testing Serbia, Analysis LLC, Dectris AG, Tescan/Mikrolux LLC as well as the European Microscopy Society, without whom this conference would not have been possible. ■

Vuk Radmilović
ELMINA Conference Manager
(website: http://elmina.tmf.bg.ac.rs/)

8th Workshop on Focused-Electron-Beam-Induced-Processing

12-15 July 2022, Krakow, Poland

The workshop on Focused-Electron-Beam-Induced-Processing (FEBIP) is dedicated to recent advances in 3D additive manufacturing and etching with focused electron beams at the nanoscale. It is a regular two-yearly international meeting, with the former editions held in Delft, Netherlands (2006), Thun, Switzerland (2008), Alabama, United States (2010), Zaragoza, Spain (2012), Frankfurt, Germany (2014), Vienna, Austria (2016) and Modena, Italy (2018). In 2022 the meeting was organized in Kraków, Poland by the Academic Centre of Materials and Nanotechnology by AGH University of Science and Technology.

The FEBIP workshop consisted of nine thematic sessions dedicated to the fundamental interactions between electrons, gas molecules and the substrate, as well as the possible applications of the produced three-dimensional nanostructures in the areas of magnetism, superconductivity and plasmonics. The final part consisted of sessions devoted to the further development of this technology and setting new trends in this subject.

This year's edition was part of a larger event entitled "Focused Charged Particle Week", which was opened with the 2nd FIT4NANO Cost Action workshop concentrated on ion technology and connected thematically with FEBIP by a joint session. More information about the FEBIP workshop is available on the website: **https://www.acmin.agh.edu.pl/en/febip2022** ■

Dr. Aleksandra Szkudlarek and Dr. Ivo Utke

2nd Joint Meeting of the Microscopy Society of Ireland and the Scottish Microscopy Society

6-8 April 2022, Galway Bay Hotel, Salthill, Galway, Ireland

The Joint meeting of the Microscopy Society of Ireland (MSI) and the Scottish Microscopy Society (SMS) was held in Salthill, a beautiful seaside resort overlooking Galway Bay. MSI and SMS have been co-hosting sessions at the biennial Microscience Microscopy Congress in conjunction with the Royal Microscopical Society (RMS) since their first joint meeting held in Glasgow in 2014 up until the beginning of the global pandemic and it was fantastic to bring both societies back together in person.

Given the effects of the pandemic on our early career researchers (ECRs), we placed a large emphasis on supporting them by providing bursaries to attend and dedicating day 1 of the conference to this topic. Following a welcome address from co-chairs Dr Kerry Thompson (MSI) and Dr Charlotte Buckley (SMS) we delved straight into ECR Flash talks which introduced all the delegates into an exciting overview of the microscopy-related research happening across Ireland and Scotland. This was followed by a Q&A panel discussion enabling our ECRs to learn and ask questions to panellists on different career paths whose primary focus was on microscopy related work and research, in industry, trade, a core facility or in an academic position. The day concluded with a short walk, made shorter with the help of the 'Wild Atlantic Way' gale force winds, to O'Reilly's Bar for a microscopy related table quiz.

Sessions for Day 2 and 3 included Instrument Development, Image Analysis and Correlative & Multimodal Imaging, along with a Life and Physical Science with a mix of invited speakers and short talks covering microscopy across the Life and Material Sciences (and the interesting spaces between). To provide an idea of the multidisciplinary nature of this meeting some notable highlights include a STEM interlacing approach allowing for greater flexibility in imaging dose sensitive materials (Jonathan Peters, Trinity College Dublin), how to image beating zebrafish hearts in vivo (Dr Jonathon Taylor, University of Glasgow), how to build a microscope without knowing how to build a microscope (Ms Niamh Burke, University College Dublin), what it is like to work as a Core Facility Image Analyst (Dr David Barry, Francis Crick Institute). The Microscopy Community is vital to many areas of research and both the MSI and SMS regard support and development of the utmost importance. To this end we also included a Community Development session which included an invited talk from Dr Caron Jacobs – University of Capetown on Building Microscopy Capacity in Africa and a panel discussion on the support and development of essential research infrastructure.

There was a palpable buzz at the poster session which took place at the end of Day 2 before the Gala dinner. There was so much discussion going on at the posters that the judges found it difficult to get to talk to presenters, a good complaint though.

Of course, these meetings would not be complete without the presence of our trade representatives and we were delighted with the response from both Ireland and Scotland. They not only showcased new technologies and gave technobite talks, but they were also incredibly generous with their time discussing career paths with our ECRs, and of course participated in the table quiz. All delegates, particularly those who had never experienced a trade exhibition, were excited to be able to test out equipment on display.

After a 2 year hiatus of in person meetings I think all delegates would agree that this meeting was a great success and fantastic to get fully immersed in talks, networking and in-person discussion for 3 days without the easy distractions of online meetings.

Both societies are very grateful for the support from our trade representatives, the RMS, European Microscopy Society, Focal Plane, SULSA and the Chan Zuckerberg Initiative who enabled us to keep registration fees low.

To learn more about the Irish and Scottish Microscopy Societies, or if you are interested in joining either, visit the following websites. ■

Microscopy Society of Ireland:
www.microscopy.ie

Scottish Microscopy Society:
www.scottishmicroscopygroup.org.uk

Quantitative Electron Microscopy (QEM 2022)

8-20 May, 2022; Port Barcarès, France

QEM2022 (5th edition) took place between Sunday, May 8, 2022 and Friday, May 20, 2022 (13 consecutive days) on the Mileade site (Estanyot) in Port Barcarès. This edition was organized in this center for the first time. We welcomed 102 students, 37 speakers and 15 engineers and technicians from partner companies/institutions (logistical help and installation of machines). All these people (except some engineers and technicians of private companies) were accommodated in full board in the Mileade center, whose staff perfectly accommodated the presence of this physicist assembly and ensured an irreproachable support (technical, administrative, logistic...) during all the stay.

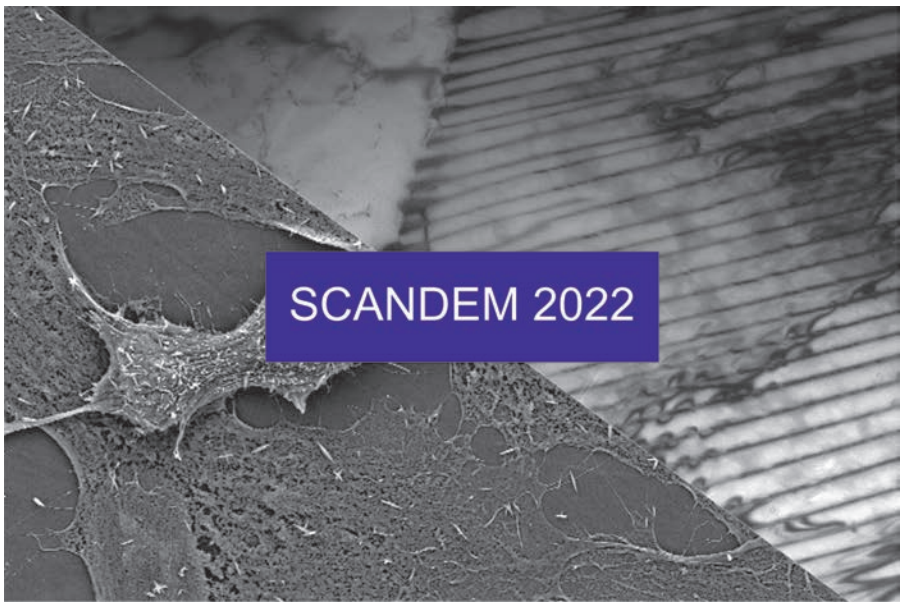
The conference room was arranged to accommodate the students in a comfortable way (3h of course / day minimum). It was also used to install experimental setups: a JEOL Transmission Electron Microscope, an energy filter, an ultra-fast camera and a last generation sample preparation setup provided by the GATAN company, dedicated TEM holders placed at the disposal by the companies Gatan and PROTOCHIPS, and a plasma cleaner installed by the EDEN instruments company. This room also hosted 2 spaces for remote practical work sessions organized by ThermoFisher and Tescan. We also performed a live demonstration of a unique monochromated STEM microscope located in Orsay (LPS laboratory).

Three other rooms were equipped with 45 computers connected to a local network and cloned for the practical sessions of data processing, using a complete range of free software but also commercial software made available by the companies GATAN, HREMResearch and Protochips. The communication during the conference was ensured via the website, a dedicated smartphone application and by the distribution of a daily newspaper, La Gazette, edited and printed locally on a daily basis.

QEM2022 organizers have made the EMS logo appear on all the communication of the conference, including Smartphone Application Notification, Twitter feed, Newspaper, etc. ■

Sophie Meuret
CNRS Researcher - CEMES/I3EM team
Toulouse, France

72nd annual SCANDEM *conference 2022*



Apart from preparing for the EMC-2024 in Copenhagen (see separate report by Professor Klaus Qvortrup, conference chair), we organized our society's annual conference in June.

This was the 72nd annual SCANDEM conference. Although by the end of 2021 and at the beginning of this year 2022 we began to see a recovery from the pandemic, it was still too early to plan an in-person meeting, hence a virtual meeting once again. The conference was organized from Tampere University, Finland, by Professor Minnamari Vippola and her highly capable team. The meeting ran three full days, from Monday 20th to Wednesday 22nd June. The first two days were the actual conference days, but the third day was the webinar day.

The meeting was a great success. Both life and material sciences were covered, each comprised four sessions. The registration showed approximately 220 attendants with 70% from Nordic countries, and altogether 25 different countries represented in the conference. About 50 abstracts were accepted. The third day covered 21 webinars from companies. The programme of the conference included 4 plenary lectures, 28 contributed talks from the academic sectors, researchers, and students, over 15 company short presentations, and 19 video posters mostly from students. Topics of the plenaries were both advanced and timely. They included: 3D characterization of nanomaterials (Sara Bals, University of Antwerp, Belgium); SARS-CoV-2, the entry into human cells and possible preventions (Giuseppe Balistreri, University of Helsinki, Finland); Quantitative and 3D electron microscopy for materials science (Jianghua Chen, Hunan University, China); and Volume CLEM, the ongoings and the advances (Lucy Collinson, Francis Crick Institute, UK). Six students were awarded best presentation prize. The conference concluded with SCANDEM General Assembly.

The good news now is that the next SCANDEM meeting, the 73rd annual conference, will be physical, in-person and on-site. It is scheduled to take place in Uppsala, Sweden, in 12-15 June 2023, at the Ångström Laboratory, Uppsala University, organized by Professor Klaus Leifer and his capable team. We anticipate active attendance from the Nordic and many other regions, as well as full company presentations on site. See you in Uppsala. ■

Kesara Anamthawat-Jónsson,
SCANDEM 's president.

Notes

Reports on special events

ELECMI International Workshop

27-28 October, 2022; Barcelona, Spain

The 4th Edition of ELECMI International Workshop took place in Barcelona from 27th to 28th October, 2022. This workshop is organized every year by one of the nodes of ELECMI, a Singular Scientific Technical Infrastructure (ICTS) in the ICTS map of the Spanish State, coordinated by Pilar Cea from LMA.

After the previous editions in the nodes of Zaragoza (2017, 2018) and Madrid (2019), this 4th ELECMI International Workshop was held in the Universitat de Barcelona node and organized by its core facilities, the Scientific and Technological Centers (CCiTUB).

This annual workshop aims to be a reference meeting for all researchers interested in electron and scanning probe microscopy techniques.

This year, it focused on three topics: Transmission Electron Microscopy, Scanning Probe Microscopies and Scanning Electron Microscopy/Dual Beam.

The workshop was an in-person and free meeting that involved 22 invited talks, including researchers and companies, and three plenary talks by Odile Stephan (Solid-state Physics Laboratory, Université Paris-Saclay), José María Valpuesta (President of the European Microscopy Society) and Ana M. Sánchez (Department of Physics University of Warwick).

More than 100 attendees participated in a constructive debate led by PhD Francesca Peiró (LENS-UB), vice-president of the Spanish Society of Microscopy and workshop co-chair along with CCiTUB director, Dr. Juan Fran Sangüesa, about the potential of microscopy techniques for both material and soft matter characterization.

The event was sponsored by IZASA, the Institute of Nanoscience and Nanotechnology of the University of Barcelona (IN2UB) and the Spanish Society of Microscopy. ■

Prof. Dr. Francesca Peiró
Full Professor (Catedràtica d'Electrònica), Physics Faculty
Vice-president of the Spanish Microscopy Society (SME)

Link of the event:
http://www.ccit.ub.edu/elecmi4

A look back at 2022: the best of ESTEEM3

*ESTEEM3 - **E**nabling **S**cience and **T**echnology Through **E**uropean **E**lectron **M**icroscopy is an integrated infrastructure network of **European Electron Microscopy Facilities** providing **Transnational Access** for academic and industrial research communities in materials, physical, chemical, and life sciences to the most powerful electron microscopy instrumentation and techniques available at the nanoscale.*

2022 has been marked by several successes for ESTEEM3 and its team. Here is a brief overview of the most important events!

Successful Transnational Access (TA)

The project offers researchers in the private or public sector worldwide free **Transnational Access** to the best facilities and expertise in electron microscopy for the study of materials.

In 2022, ESTEEM3 has so far provided access to more than 400 projects, and many successful projects were realised through **Transnational Access**, which shows the necessity towards access to cutting-edge TEM infrastructures in Europe and proves that ESTEEM3 is a solid and indispensable network to support the European electron microscopy community.

More and more collaboration with Joint Research Activities (JRAs)

ESTEEM3 member laboratories **and especially SMEs** (Attolight, CEOS, DENSsolutions, Nanomegas, and Quantum Detectors) also develop **Joint Research Activities, with so far more than a hundred published manuscripts:**

- one axis is to develop *new techniques* in electron microscopy,
- a second axis is devoted to the study of *materials for ICT, energy, health*, and *transport*,
- and a third axis concerns *automation* and *big data*.

LiberTEM

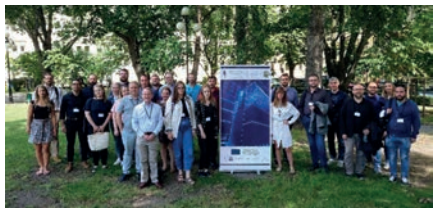
As one leading excellent **Joint Research Activity**, the LiberTEM project led by the Ernst Ruska-Centre for Microscopy and Spectroscopy at the Forschungszentrum Jülich (Germany) aims to work on the development of standardised interfaces for high-throughput distributed live data processing to make microscopy using advanced high-performance computational methods as intuitive, interactive, and easy to use as conventional microscopy.

Bye Covid-19 and hello Networking Activities (NAs)!

Additionally, ESTEEM3 deploys an **education and training** component by organizing schools, workshops, and webinars as **Networking Activities**, where upcoming events are announced at the ESTEEM3 webpages: **https://www.esteem3.eu/news** and **https://www.esteem3.eu/Upcoming-events**

In 2022, 4 successful trainings were organized in the project framework:

- Quantitative Electron Microscopy, 08-20 May, by LPS Orsay in Port-Barcarès (FR)
- 6th Stanisław Gorczyca European School on Electron Microscopy and Tomography, 12-15 July, by AGH-UST in Kraków (PL)
- Transmission Electron Microscopy of Nanomaterials European Summer workshop, 12-16 September, by UCA in Cadiz (ES)
- Advanced Transmission Electron Microscopy Specimen Preparation, 24-28 October, StEM Stuttgart (DE)



ESTEEM3 has participated in major events such as the **16th Multinational Congress on Microscopy Conference**, and the **International Conference on Research Infrastructures**, in Brno (Czech Republic) and still plan to organise other events in 2023 such as,

- Trainings:
  - European workshop on quantitative STEM imaging with the Jožef Stefan Institute, in Ljubljana (SI)
  - School on in-situ TEM with the Ernst Ruska-Centre for Microscopy and Spectroscopy with Electrons in Jülich (DE)
- Internal events:
  - International workshop on innovation, online
  - ESTEEM3 final workshop, Paris (FR) ■

To stay informed about key scientific publications, training, transnational access, and our upcoming events, join our community:

- Subscribe to our **newsletter** at **https://www.esteem3.eu/Newsletters**
- Follow us on **social media**
  LinkedIn: **https://www.linkedin.com/company/esteem3/**
  Twitter: **@Esteem3Project**

The silver Ernst Abbe medal of the New York Microscopical Society

Prof. Brian J Ford award

Brian J Ford has been awarded the silver Ernst Abbe medal of the New York Microscopical Society in recognition of his lifetime devoted to furthering microscopy. Professor Ford, a fellow of Cardiff University and a former fellow at the Open University, is preparing for the tercentenary of the death of the father of microbiology, Antony van Leeuwenhoek, after identifying two unknown Leeuwenhoek microscopes in the space of a single year.

The first to be identified was fashioned from silver and had been brought to Christies, the London auction-house, for appraisal. Professor Ford was asked to provide authentication and concluded that it was clearly typical of Leeuwenhoek's construction. This microscope has since been exhibited in California and the Netherlands, and is now in a private collection.

Another made from brass was found in mud excavated from a Delft canal and deposited in landfill. It was thought to be a modern replica, but Professor Ford used scanning electron microscopy at the Cavendish Laboratory of Cambridge University to demonstrate the characteristic method of manufacture which was used by Leeuwenhoek, and not by replica manufacturers. He also used EDX analysis to identify selenium in the brass Leeuwenhoek used, which confirmed its origins in the Falun copper mines of Sweden. The discovery of this unique instrument was announced in *Nature*, and this microscope has since been declared a national treasure by the Spanish authorities.

Professor Ford had earlier discovered Leeuwenhoek's surviving microscopical sections in the archives of the Royal Society of London, and was the first person to take photographic images of Leeuwenhoek's own specimens observed through one of his own microscopes. It had been believed by scholars that no such specimens existed, and that they must have been crudely prepared. We have now realised that Leeuwenhoek was a diligent microscopist who prepared excellent sections, and Ford has shown that the early microscopes could clearly resolve objects of bacterial dimensions. ■

Ms J M Smith, Cambridge

Molecular Diagnostics Training School & Digital Pathology and Image Analysis Training School 2022

February 21-25; Vienna, Austria (virtual)

This year the fourth *Molecular Diagnostics Training School (MDTS, 21-23 Feb 2022)* and the third *Digital Pathology and Image Analysis Training School (DP&IATS, 24-25 Feb 2022)*, being a joint venture of the Department of Pathology (Medical University of Vienna, Austria) and the Nottingham Molecular Pathology Node (University of Nottingham, United Kingdom), were again hosted virtually, as a consequence of the *Global COVID-19 Pandemic*. Albeit being a great challenge, this global health crisis also acts as a potent catalyst in the shift from the analogue to the digital space, not only in the academic educational setting. Hence, the current events put a new complexion and depth of meaning on one of our main themes of the *training school (TS)*:

'Digital Pathology and Image Analysis: Prepare, the future is here!'

Being aware of the importance of introducing these new and emerging technical methodologies, the *TS* also aimed at providing sound post-graduate education in molecular diagnostics which was encapsulated in the second main theme of the *TS*:

'Applying Molecular Diagnostics is important, not a miracle!'

In line with this statement, lectures on basic methodologies, quality assessment/assurance as well as the implementation of molecular diagnostics that shall be performed on a daily basis, on an organ system level, were given by a number (*n = 38*) of world-renowned experts in these fields.

Top left-hand corner: The Chair of the MDTS & DP&IATS 2022, the following images constitute a subset of the speakers who gave consent to use their photographs for this report.

After a week of intense lectures (~8.30 am – 6 pm) and lively discussions with a daily average attendance of 56 attendees (MDTS: range: 58-52) and 29 attendees (DP&IATS: range: 26-31) we were delighted by the feedback from attendees (representative feedback statements were as follows):

"A very good basic lecture for residents such as me who are early on in their career." (MDTS)

"A rare glimpse into the field of clinical genetics, that very quickly demonstrated the need for future collaboration. Clear, practical, actionable information." (MDTS)

"The course was absolutely fantastic. I loved it." (MDTS) "Learned a lot I can use in my daily routine" (MDTS) "Very interesting presentations!" (DP&IATS)

The majority of attendees noted that the sessions offered new insight or ideas that they could take back and apply to their jobs.

Hosting these TS on our dedicated event platform (Webex) also added to the success of this online event, which is reflected by the feedback and the consistent and animated engagement of attendees, and we are looking forward to the upcoming MDTS & DP&IATS 2023, which will be held as hybrid events. ■

Chair:
Univ. Prof. Dr. Renate Kain, PhD[1]
Prof. Mohammad Ilyas BSc, MBChB, DPhil, FRCPath[2]
Ao. Univ. Prof. DDr. Leonhard Müllauer[1]

Organising Committee:
Mag. Gertrude Krainz[1]
Maximilian Köller, MD[1]

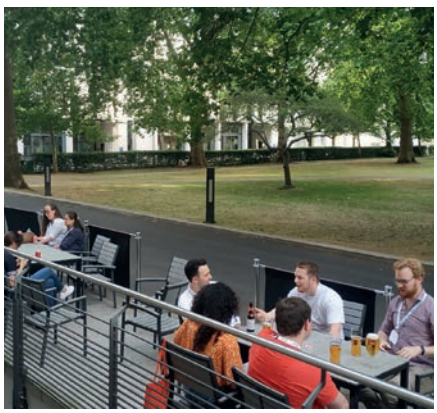
1. Medical University of Vienna, Department of Pathology, Austria
2. University of Nottingham, Division of Cancer and Stem Cells, United Kingdom

EMAG2022 Meeting

6th-7th July 2022; Imperial College London

The electron microscopy and analysis group (EMAG) of the Institute of Physics of UK and Ireland focus on the development and use of electron beams for microscopy, lithography, structural and chemical analysis within the physics community and beyond. In recent years, EMAG has alternated the form of its UK meetings, in years when the Royal Microscopical Society's (RMS) mmc meeting takes place, the EMAG meeting becomes a set of dedicated symposia under the mmc unbellera. In the alternate years the EMAG organizes a standalone focus meeting and this year the committee returned to London for the first entirely in-person EMAG meeting for 3 years.

The topic for the 2022 focus meeting was 'Multidimensional Electron Microscopy', reflecting the recent developments in spectroscopy, diffraction and in-situ multimodal experiments. We assembled a broad range of plenary and invited speakers to address this fast-developing topic from diverse angles. The Plenary lecture by Prof Deb Kelly (Penn. State University, USA) showcased the range of technical breakthroughs (including in-situ electron microscopy) needed to isolate, fix and ultimately characterize the inner workings of the COVID viruses that have dominated so much of human activity in recent years. In addition, invited speakers covered topics ranging from in-situ mechanical deformation (Dr Finn Giuliani, Imperial College), high throughput tomography (Dr Sean Collins, University of Leeds), low voltage ptychographic imaging (Dr Andy Maiden, University of Sheffield) and vibrational (Dr Fred Hage, Oslo) and magnon (Dr Budhika Mendis, Durham University) studies of materials. These talks were supported by a wide range of talks contributed by the electron microscopists from PhD students through to senior academics both from UK and abroad. A copy of the programme and abstracts submitted is available at:
https://iop.eventsair.com/emag2022/programme-live-online



The return to an in-person meeting also allowed the return to a live industry exhibition. There was an excellent attendance and atmosphere in the exhibit, with positive feedback from delegates and exhibitors about the opportunity to refresh working relationships and to build new networks between the academic community and the commercial partners supporting their work.

The poster sessions on the second day of the conference repeated the high level of engagement seen in the exhibit on the first day. The lively discussion continued throughout the periods between the lecture sessions. The breadth of topics covered in the sessions was a testament to the efforts of the group and its members over recent years. Further to this, the flash presentations (2 minutes maximum) incorporated into each lecture session increased the visibility of individuals and their research.

EMAG meetings have always encouraged the precipitation of early career electron microscopists. This year, their work presented in the lectures, flash session and posters are of very high standard. This made the job of awarding student prizes particularly difficult. Indeed the committee were debating the final list several minutes after they had hoped to be announcing the winners, given the quality to choose between. The full list of student prize winners will available at EMAG group's 2022 newsletter which can be viewed at EMAG group website (**https://www.iop.org/physics-community/special-interest-groups/electron-microscopy-analysis-group#gref**).

The return to a physical meeting also allowed the return of social and networking events. With generous sponsorship by JEOL the first day of the conference was rounded off with an informal dinner and drinks reception. The ability to see long-time collaborators and friends as well as to meet the newest members of the community was gladly accepted by everyone. Building and maintaining these professional and personal connections is something that helps groups to flourish. This event in particular felt like an important step in putting the challenges of the recent lockdown years behind us all.

(The EMAG2022 delegates enjoying the informal social evening at the prince garden, Imperial College, Image supplied by Jun Yuan)

The meeting owes its success to the hard work of the local organizing team of Dr Catriona McGilvery and Dr Shelly Conroy and the IoP conference team.

Going forwards, planning is underway for mmc2023 incorporating EMAG2023 in Manchester, July 2023. This will see the return to a larger meeting with colleagues from across the full range of the microscopic sciences. In particular EMAG is organizing a joint symposium with the semiconductor physics group of the IOP to highlight a range of research including semiconducting nanomaterials, device manufacture and in-situ and *in-operando* studies. ■

Prof Jun Yuan, (EMAG chair) and Dr Alex Eggeman (EMAG ordinary committee member)

EMS Scholarships reports

Petruša BORŠTNAR

16MCM, Brno, Czech Republic

My name is Petruša Borštnar and I am a PhD student at the Advanced Materials Department at Jožef Stefan Institute in Ljubljana, Slovenia. It was a pleasure to participate at the 16th Multinational Congress on Microscopy which was held from 4 to 9 September 2022 in Brno, Czech Republic. At the conference, I attended very interesting plenary talks, excellent presentations from the experts as well as other young scientists from various fields of microscopy, and also talks about the latest developments from the companies in the field of microscopic instrumentation. Along with the talks I have enjoyed the poster contributions. I was also able to share and discuss my recent work titled 'Atomic-scale characterization of polytypic defects in $Li_{0.33}La_{0.56}TiO_3$' in the session MS2-Ceramics, rocks, and minerals.

The conference was a great opportunity to widen my knowledge and to meet fellow researchers. Therefore, I would like to thank EMS for the financial support to attend the conference and also to the organizers for an excellent conference with a wide range of topics and many social events. ■

Michele BRUGGER-HATZL

FELMI-ZFE, Graz, Austria

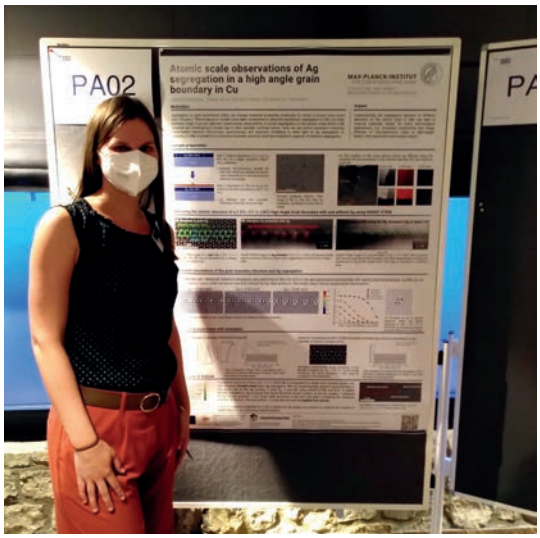
First of all, I would like to thank the European Microscopy Society for the EMS scholarship, which enabled me to attend the 16th Multinational Congress on Microscopy in Brno (Czech Republic) on September 04-09. The lectures were very interesting, giving an insight into new developments in different fields of microscopy. I have contributed to the conference, giving a talk about '3D-Nanoprinting of Magnetic Force Microscopy Tips'. Since magnetic devices play an important role in modern electronics and data storage, it becomes of great interest to analyze magnetic nanoscale features. In that context, my presentation focused on fabrication of functional high-resolution tips for Magnetic Force Microscopy using an emerging 3D nano-printing technology, called Focused Electron Beam Induced Deposition (FEBID). This approach excels other methods by its additive direct-write character with an enormous design flexibility with possible apex radii in the sub-10 nm range.

There was a conference app provided which enabled to create a personalized schedule. This was very convenient for easier navigation between simultaneously holding lectures and their respective venues. Overall, the conference was very interesting and gave me the opportunity to discuss topics of my field, and beyond.

I would like to thank the EMS committee once again for supporting me in the form of the EMS scholarship and the conference organizers for their work! ■

Lena FROMMEYER

PICO2022, Vaals, Netherlands



I would like to take the opportunity to thank the European Microscopy Society for the scholarship for attending the PICO 2022 at Kasteel Vaalsbroek in the Netherlands. After the last 2 years of Covid-pandemic, it was great to finally meet in person with other researchers, exchanging ideas and thoughts and getting to know the international community. It impressed me to see such a wide spectrum of applications for aberration-corrected transmission electron microscopy, inspecting so different samples (from semi-conducting materials, metals to virus-cells and proteins) under so many different conditions. I had the chance to present my poster with the title "Atomic scale observations of Ag segregation in a high angle grain boundary in Cu" in one evening session. The received feedback will clearly advance my PhD project which is about investigating the atomic structure of different grain boundary phases / complexions in Cu and the impact of segregation towards them using HAADF-STEM and EDS. Not only that, but also seeing the work of others inspired and motivated me in pursuing my research. The location was great for having fruitful discussions and I can only thank all the people I met and talked to, making this conference unforgettable. ■

Bruno KOMAZEC

16MCM, Brno, Czech Republic

I would like to thank the European Microscopy Society (EMS) for the financial assistance that greatly enabled me to participate in the 16th Multinational Congress on Microscopy held in Brno from 04-09 September.

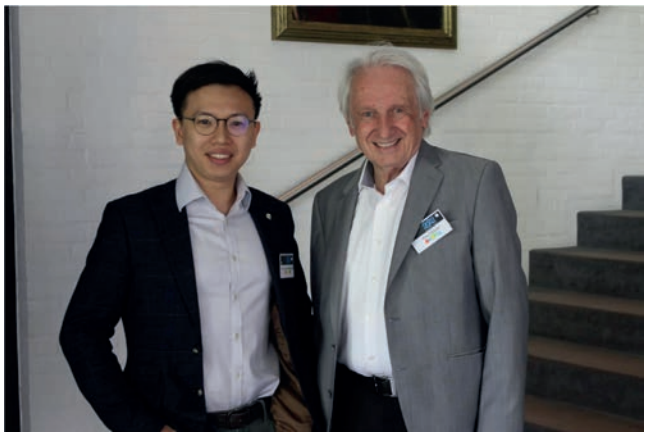
During my doctoral studies, I realized the great importance of congresses, both in the form of presenting novelties in professional fields, and in the form of connecting different researcher groups. Namely, at last year's Joint Meeting of Dreiländertagung & Multinational Congress on Microscopy 2021 (MC2021), I learned about the possibility of training in the field of preparation of biological samples for TEM in the Czech Republic. At the mentioned course, we agreed to cooperate in the form of a small project whose preliminary results I presented at this year's 16th Multinational Congress on Microscopy in the form of an oral presentation with the title "Effect of silver nanoparticles and ions on oxidative stress formation and antioxidative machinery of *Chlorella vulgaris*".

Namely, silver nanoparticles are increasingly released into the environment, mostly due to their widespread use in various industries. For this reason, I analysed their impact on algae cells and showed that the 72-hour treatment has a negative effect on the photosynthetic apparatus and the integrity of the cell itself. Furthermore, the treatment with nanosilver led to damage to the ultrastructure, which was shown by TEM analysis, while I showed by fluorescence microscopy that silver nanoparticles affect the synthesis of the extracellular polymeric substances around the cells themselves, which can trap silver nanoparticles and thus reduce the harmful effect on the cells themselves.

Finally, I would like to thank the organizers of the 16th Multinational Congress on Microscopy, as well as the European Microscopy Society, for being able to present part of my research, but also for being able to further connect with other research groups with whom we will be able to collaborate further. ■

Ping-Luen (Baron) HO

PICO 2022 - The Seventh Conference on Frontiers of Aberration Corrected Electron Microscopy, Kasteel Vaalsbroek, Vaals, Netherlands, 8th to 12th May 2022



Mr Ping-Luen Ho and Prof Knut W. Urban

Pictured with Prof Joachim Mayer and Prof Xiaoyan Zhong in PICO 2017 when Mr Ping-Luen Ho exchange studied at Forschungszentrum Jülich and RWTH Aachen University.

PICO2022 first day night poster session

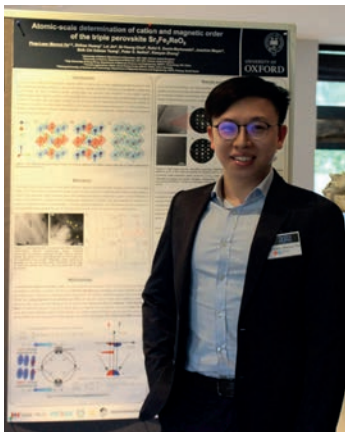
With the generous fund from European Microscopy Society (EMS), I was able to attend this year's PICO conference in Netherlands. PICO is the latest conference on Frontiers of Aberration Corrected Electron Microscopy. It was organised by the Ernst Ruska-Centre (ER-C) in Aachen and Forschungszentrum Jülich, where I did my one-year-exchange study at.

PICO is the unit for 1×10^{-12} m, and this name well fits the topic of our conference – how to apply fundamental electron optics in advanced transmission electron microscopy techniques to study solid-state research phenomena and life sciences. PICO, from my perspective, is certainly a unique conference experience for all, because it has the characteristic that all speakers are invitation based and all 190 participants are at least junior microscopists from 25 countries throughout the world. This format made every minute of my PICO experience count. It offered me the opportunity to listen to, talk to, and learn from the most admirable scholars in the field.

At PICO 2022, we celebrated the 25th anniversary of the invention, function and publication of the first aberration-corrected transmission electron microscope (AC-TEM). Four founders of this innovation were invited. One of them, Professor Knut W. Urban, shared their work in the past three decades. Listening to how they concurred multiple challenges and finally transformed theories into practice, more specifically, how they applied spherical aberration corrector to transmission electron microscope to advance resolution to sub-ångström level, I felt so moved and inspired: seeing leads to scientific advancement, understanding and engineering. The field that I studied and conducted research for more than seven years would not exist if it were not for them. Their achievements have made it possible for the more recent development and function of new materials. It has been and will continuously be substantial to not only material science but also biological medical science. Attending PICO with these founders of the field, I felt more dedicated than ever to contributing my future academic work to the blueprint that Professor Urban has pictured.

Moreover, there were many principal investigators (PI) presenting novel findings from their groups. My supervisor Professor Peter Nellist was one of them. He was one of the scholars who made fundamental contributions to the development of correctors for the inherent aberrations of electron lenses and used for the three-dimensional imaging of materials. He introduced electron ptychography application in beam-sensitive materials in the first session of PICO. The presentation given by Prof Sandra Van Aer (Antwerp) and

Prof David Muller (Cornell) was also impressive. They talked about their recent progress in developing the quantitative EM methodology while presenting their latest data and the high spatial resolution images, etc. All speakers' exciting findings made me think about my current work and I knew they would be helpful for my own research. In the session about the application of cryoEM to biomedicine, Professor Peijun Zhang (Oxford) presented a series of experimental cryoEM images that were used to investigate coronavirus and develop vaccines. From their video made with the cryoEM images, we were able to clearly observe how coronavirus was greatly weakened, damaged, broken down, and killed. In addition, Dr Christopher Russo (Cambridge) shared their developments of new instruments and methods for imaging biological molecules such as DNA, RNA and proteins at atomic resolution. As I work with imaging at atomic resolution often, this presentation was indeed memorable to me.



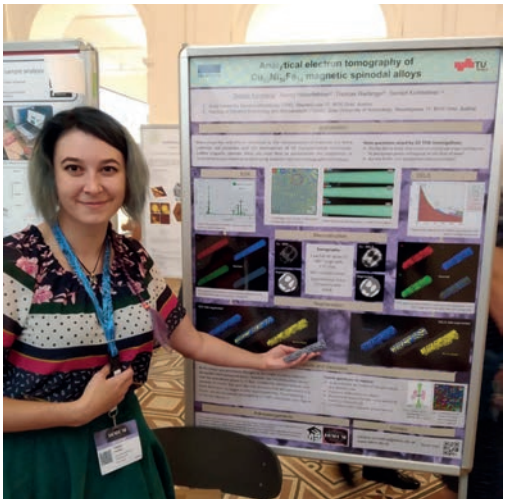
Mr Ping-Luen Ho pictured in front of his poster in PICO 2022.

I presented my poster on the first day night, the topic of my poster is "Atomic-scale determination of cation and magnetic order of the triple perovskite". It presents a study of ab initio calculations that provides physical insight into cation order and magnetic coupling in perovskite oxides at the atomic level. I explained to the audience: how ACTEM, electron magnetic circular dichroism (EMCD) and density functional theory (DFT) calculations were performed to determine the magnetic ground states and exchange parameters of the newly-discovered triple perovskite phase. I could say that to the best of our knowledge, this material and the novel performance we found have not yet been reported before.

Attending PICO 2022 confirmed my passion for this academic path. Seeing colleagues' excellent work and receiving pioneers' kind encouragement motivated me to work harder. Looking back, I was honored to have the opportunity to collaborate with Professor Urban before. We published a *Physical Review B* paper on the topic of atomic electron magnetic circular dichroism in 2017. It was one of my few publications on theoretical work and thanks to his generous guidance, I learned so much. Thinking about the present and the near future, I am so grateful for my supervisors' guidance and my peers' company. I will continue developing my professional skills and devoting to knowledge production at the University of Oxford. ■

Tatiana KORMILINA

FELMI-ZFE, Graz, Austria



The 16th occurrence of Multinational Congress on Microscopy took place in Brno, Czech Republic on September 04-09. The location was very fortunate giving the unique microscopy ecosystem built by the proximity of research institutions and major manufacturing corporations. The latter specifically allowed the conference to be remembered through a large exhibition, workshops and social events.

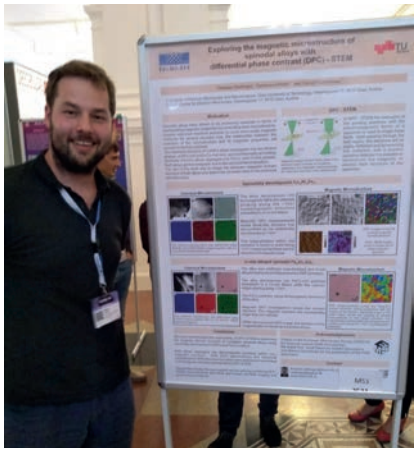
Congress has gathered many scientists eager to share their knowledge and progress. A rather progressive conference app solution allowed the participants to find interesting talks and add them into a personalized schedule, which made navigating between sessions and venues very convenient. 16th MCM carried additional importance to be one of the first post-pandemic scientific gatherings to take place on site. In this context even more impressive was a smooth integration of remote talks held by several participants that were not able to attend in person.

I have made a contribution with a poster presentation titled "Analytical electron tomography of CuNiFe magnetic spinodal alloys". Poster sessions were situated in the Museum of Applied Arts which offered a spacious hall where posters could be visited on each of the three poster session days, making presented research very accessible. Novel was the use of digitally-displayed posters. It had not been communicated sufficiently, and have therefore provided more confusion than assistance. In my opinion, however, digital posters offer great prospects for incorporating animated media, so as a 3D-microscopist, I am hoping to see them developed into a casual presentation option.

I would like to express my gratitude to the conference organizers for their work and EMS for supporting my attendance of the conference. ■

Thomas MAIRHOFER

16MCM, Brno, Czech Republic

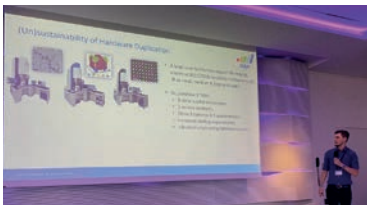


First of all, I would like to thank the European Microscopy Society (EMS) for the financial support that enabled my participation in the 16th Multinational Congress on Microscopy (16MCM) from 04.09.2022 – 09.09.2022 in Brno. With this, I was able to present my current research in form of a Poster (title: *Exploring the magnetic microstructure of spinodal alloys with differential phase contrast (DPC) – STEM*). As a young scientist such an international conference is a great and vital opportunity not only to share the own research but also to get critical review and new input from experts across all the different fields of (electron) microscopy. All these lively discussions about my and others research offered me a great opportunity to improve my scientific communication skills and to establish new contacts to experts within my field of research. After almost two years of online meetings and conferences, this was my first attendance at a real, in-person, international conference and the impressions, experiences and knowledge I gained will last and influence my future work.

I am very grateful that I was able to contribute to this extraordinary congress and I do not want to miss the opportunity to thank the organizers of the conference. Beside the possibility to listen to top-notch scientists, e.g. Nobel Prize laureate Prof. Richard Henderson, Prof. Ute Kaiser or Prof. Quentin Ramasse, the social events (e.g. the various coffee/beer brakes and the charity run on Thursday morning) and excursions made this week very enjoyable, instructive and fun. I am sincerely thankful for the financial support from the EMS so that I was able to enjoy this conference in Brno with all its facets as well as the Czech beer. ■

Patrick McBEAN

16MCM, Brno, Czech Republic
School of Physics,
Trinity College Dublin, Ireland



Despite Brno being the second largest city in Czechia, it's not a common tourist destination, and is relatively small, with only about a quarter the population of Prague. However, Brno is the heart of electron microscopy manufacturing in Europe, and 30% of all TEMs manufactured worldwide are made there.

MCM was held for a week in the Best Western Premier Hotel International, located centrally in Brno just beside the 13th century Špilberk Castle, beneath which is an old nuclear shelter that is now both a museum, and a hostel for if you want to truly experience the Cold War era hardships.

The conference itself began on Sunday with several workshops before the opening ceremony, which concluded with an excellent talk from Nobel prize-winner Richard Henderson on electron cryomicroscopy in structural biology. Talks continued across the following four days, with plenary lectures to kick the mornings off, followed by the regular talk sessions, and poster sessions in the evenings. I myself spoke on the Wednesday about my research on a user-adjustable pole-piece for TEMs, on which I received several excellent questions and which led to interesting discussions afterwards during the coffee break.

On the final evening, there was a panel discussion on microscopy challenges for both scientists and manufacturers, comprising of Ute Kaiser, Quentin Ramasse, and Richard Henderson, as well as Jaroslav Klíma, CEO of Brno-born Tescan, and Peter Strelec, site lead for Thermo Fisher Scientific's Brno site, for their insights from the manufacturers side.

Finally, the conference concluded with a day of visits to several of the nearby factories, offered by both the previously mentioned companies, as well as Delong Instruments and NenoVision. Unfortunately I had to fly back that morning so I missed the factory visits, but I greatly enjoyed the conference and the opportunity to present my work in such a relevant location.

I would like to thank the European Microscopy Society, the Royal Society, Science Foundation Ireland, and the School of Physics in Trinity College Dublin for their financial support to allow me to attend this conference. ■

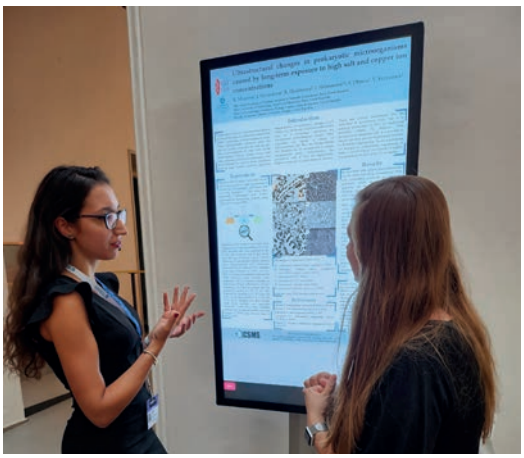
Horák MICHAL

16MCM, Brno, Czech Republic

The 16th Multinational Congress on Microscopy was in the beautiful south-Moravian city Brno. It was with approximately 700 attendees the largest European conference I have ever attend. There were just two larger event I took part – IMC in Prague and IMC in Sydney. This conference was not just about science but also about meeting many people in person which was hardly possible last two years. As Brno is my hometown this MCM was a very special conference for me. In April I invited my friends and colleagues from Austria to attend MCM during the ASEM Workshop in Linz. I was very happy to see them five months later in Brno. On the other hand, I could not start with preparation of my presentation in the train to the conference, as I usually do, simply because there is no time for that during the 10 minutes in trolleybus and 5 minutes in tram. I have presented two presentations. My poster was titled "Magnetic field imaging with electron energy loss spectroscopy based on Babinet's principle" and described a method for indirect measurement of magnetic near-field of a structure by measuring the complementary electric near-field of complementary anti-structure. The poster has a perfect location just next to a ThermoFisher SEM for live demos and I had several fruitful discussions with ThermoFisher experts, too. The only disadvantage was that it was too far from beer. Anyhow, Pilsner Urquell is not a bad beer, but served in small glasses suitable mostly for a juice tasted quite unusually. I think we have much better local breweries with a better craft beer in Brno. My talk was titled "Plasmon resonances in biocompatible nanoparticles" and presented my research on plasmonic nanoparticles of unconventional materials – silver amalgam and gallium. As my talk was on Wednesday afternoon in the second half of a materials section, I was not expecting a huge audience. Maybe also because I generally dislike giving talks in late afternoon and I would personally attend a different session, too. However, my talk has a lot of listeners and was followed by a fruitful discussion which made me happy. The end of the conference was followed by excursions to Brno electron microscopy ecosystem… but as the life is not only about microscopy, I was at that time already in the highlands at a meeting of Czech mountain tourists. I hope if you were in Brno, you enjoyed the conference, the electron microscopy ecosystem… and the city, Czech beer, Moravian wine, etc. See you later somewhere else. ■

Kateřina MRÁZOVÁ

16MCM, Brno, Czech Republic
Institute of Scientific Instruments of the CAS, Czechia



Firstly, I would like to thank EMS for granting me the scholarship, which enabled me to attend the 16MCM as this was the first conference, where I was able to present the results of my work in person. My poster presentation was focused on the study of morphological changes in bacteria induced by long-term exposure to stress factors. Thanks to the opportunity to finally meet in person after two years of online conferences, I was able to discuss some of our findings with scientists from my field of study and several very interesting and helpful ideas for further analyses were suggested to me.

The 16MCM offered also many interesting talks, especially the lecture of Richard Henderson, Nobel Prize laureate. His lecture on the development and possible future of cryo-electron microscopy was inspiring as well as the final panel discussion "Microscopy challenges for scientists and manufactures", where not only world-known scientists participated but also directors from the two biggest companies producing electron microscopes in Brno joined the debate.

It was a great joy to be able to finally meet in person with researchers from various fields of microscopy and learn much new information about the possibilities of electron microscopy. I am grateful to the organisers that even though the COVID situation was still uncertain they managed to hold the conference in person which enabled us, participants, to visit not only the conference but also to visit local microscopy companies and research institutions. ■

Michael OBERAIGNER

16MCM, Brno, Czech Republic

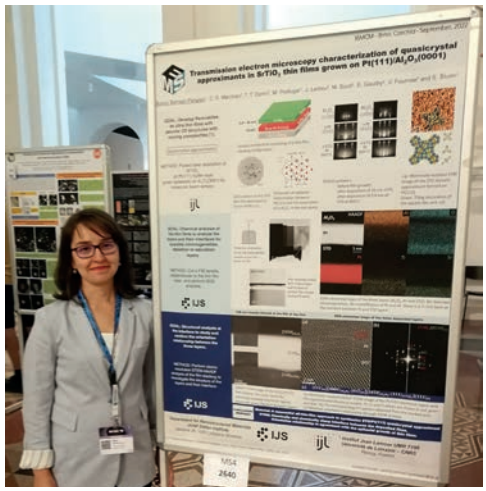
My name is Michael Oberaigner, a PhD student at the Institute of Electron Microscopy and Nanoanalysis at the TU Graz, working in the field of high-resolution STEM-EELS. I started my PhD a few weeks before the first Covid-19 lockdown was announced, when many conferences were cancelled or delayed. After several virtual conferences, the 16MCM was my first large in-person conference. Although all the virtual conferences were excellently organised, the experience was not the same – or as rewarding – as face-to-face conferences. It was a pleasure to be involved in the interesting discussions that arose during coffee breaks and poster sessions, including with people from other research fields.

My contribution to the conference was a talk with the title "Orbital mapping of the $LaAlO_3$-TiO_2 interface by STEM-EELS". For orbital mapping, fine spatial and energy features have to be detected. However, recorded spectrum images are very noisy due to the short dwell time, which is limited by specimen drift and beam damage. To counteract this problem, we developed a post-processing sequence using a combination of multi-frame imaging and principal component analysis denoising. With this, we are able to map orbitals in rutile and at the oxide interface of $LaAlO_3$-TiO_2. Oxide interfaces can exhibit novel properties, which differ from properties of the bulk material, like high temperature superconductivity, 2DEG formation, and many more. We hope that our approach can support the understanding of the fundamental physics behind such phenomena and reveal the potential of the development of new technologies.

I would like to thank the European Microscopy Society for supporting my attendance at the 16th Multinational Congress on Microscopy. ■

Sorour Semsari PARAPARI

16MCM, Brno, Czech Republic



It was a great pleasure for me to attend the 16MCM conference in Brno, Czech Republic, which was held from 4th to 9th September 2022, once again in person. I would like to thank the European Microscopy Society for the financial support as the travelling scholarship and also the organizers of the 16MCM for an excellent meeting where nearly 700 participants attended.

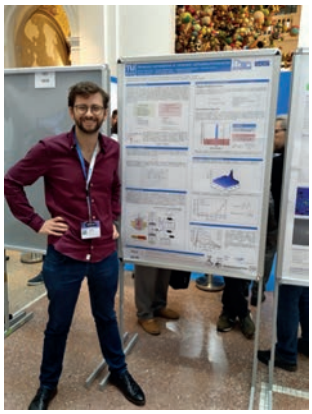
This year's Multinational Congress on Microscopy, once again brought together scientists from various fields of microscopy to share their expertise and present the latest developments in the topic. It was a great opportunity to meet and discuss in person with many excellent scientists and microscopists, and to listen to their presentations live at the conference hall. Moreover, I had the chance to visit the vast exhibition area and discuss with many microscopy-related company representatives about the latest advancements in the instrumentation.

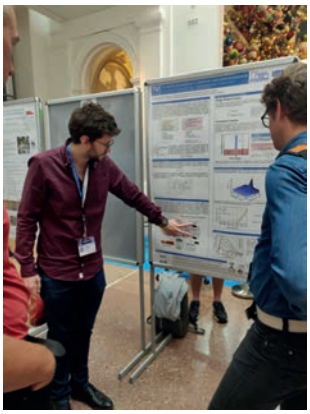
At 16MCM, I presented a poster entitled "Transmission electron microscopy characterization of quasicrystal approximants in $SrTiO_3$ thin films grown on Pt(111)/Al_2O_3(0001)". This work has been done in a collaboration between the Jožef Stefan Institute in Slovenia, and the Institut Jean Lamour in France. In this poster, I presented mostly the TEM-related part of the study and had the chance to discuss the results with many researchers, experienced and early-career, which would help me tremendously to further improve the work.

I would like to thank again the EMS and the 16MCM organizers for the opportunity, and I am looking forward to the next live microscopy event, perhaps at the 20th International Microscopy Congress (IMC20) in Korea in 2023! ■

Alexander PREIMESBERGER

16MCM, Brno, Czech Republic





With the kind support of the European Microscopy Society, I had the opportunity to take part in the 16th Multinational Congress on Microscopy. It was the first time that I attended an international conference and therefore it was especially exciting. I presented the work of our group on temporal correlations in coherent cathodoluminescence in the form of a poster and enjoyed many fruitful discussions with colleagues from a variety of fields. I am not only very new to electron microscopy, but also mostly work on instrumentation, therefore it was especially interesting to see the wide variety of applications that electron microscopes are used for, from life sciences to material sciences and semiconductor technology. For a young researcher, it is difficult to put one's own work into the context of the overall state of the art in the field, it takes time and effort to find out what questions are interesting to which people and what similar work has been done before. To be able to talk to so many different colleagues is immensely helpful in this process. In particular I enjoyed some very interesting conversations about plasmonics, a field that I knew very little about, but that is extremely relevant to my own research interests.

Apart from these direct interactions I also benefited from many of the talks, some were directly linked to my research topic, such as the talk by Michael Stöger-Pollach, others gave me very interesting glimpses into other fields, such as the talks by Richard Henderson or Attila Losonczy.

I am convinced that this conference helped me a lot in my understanding of this field and was a great step towards being able to make meaningful contributions of my own. I am very grateful to the European Microscopy Society for their support. ■

Nikola ŠIMIĆ

16MCM, Brno, Czech Republic

My Name is Nikola Šimić and I am a doctoral student at Graz University of Technology in Austria. Ever since I started with my doctoral studies in Technical Physics in March 2021, I was very excited about my work in the field of Transmission Electron Microscopy and about how much there is to be learned about measurement optimization and data evaluation.

One thing that I was missing out on (which I did not know at the time) was the exchange with international colleagues not only of my field but also from different fields related to microscopical techniques and data analysis. With the 16th MCM in Brno I attended my first conference where I could meet many interesting people. During my poster session I shared my work with other colleagues, some of which gave me invaluable advice for improvement of my current work, but also ideas as to how I could proceed with my research in the future. I even met industrial partners who gave me ideas and insights into hardware that they supplied to our institute as well as advice on how to use it properly and what to look out for during measurements.

All in all, attending the conference was a great personal success. I've gained many insights into the field I work in and got new motivation for work with TEM at our institute through fresh ideas and expert advice. ■

Mário SOUSA

16MCM, Brno, Czech Republic

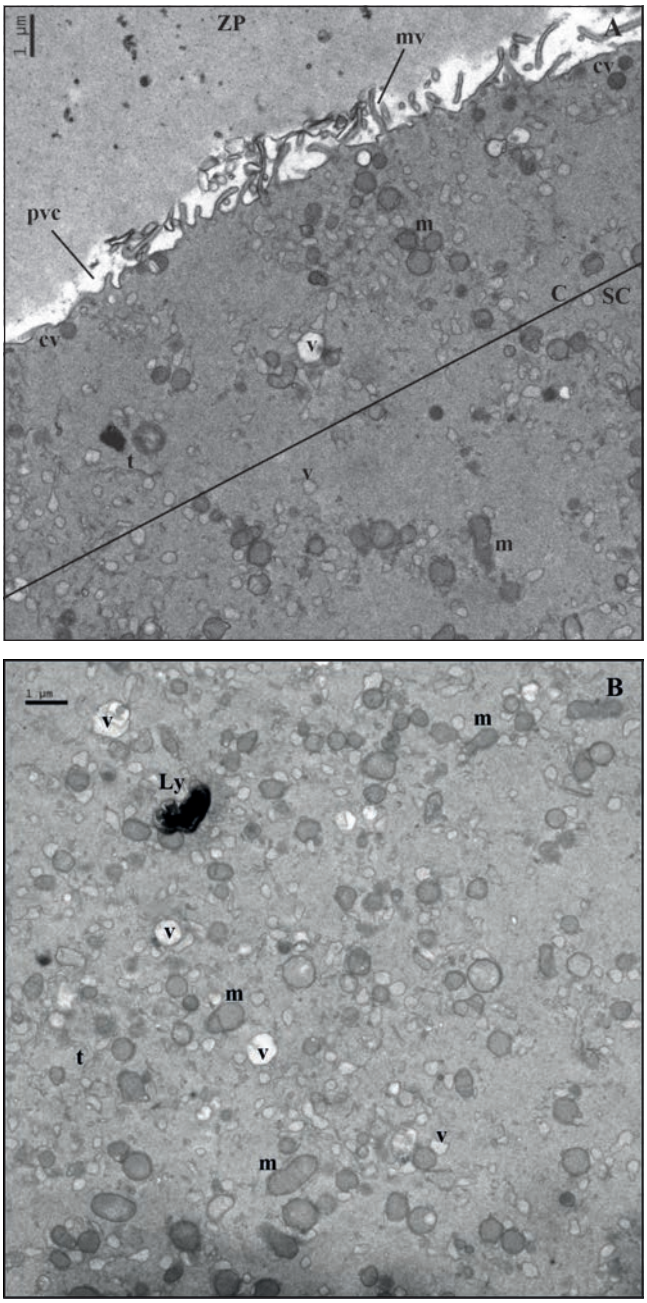
A stereological study of human donor oocytes reveals a possible cause of implantation failure

We have studied by quantitative transmission electron microscopy five surplus mature human oocytes retrieved after controlled ovarian hyperstimulation in the context of an oocyte donor program. Surplus donor oocytes were used after patient signed an informed consent agreeing to share their own gamete samples for the present study. The present laboratorial experiments were executed under the Joint Ethics Committee of the Hospital and University, CHUP/ICBAS approval number 2019/CE/P017 (266/CETI/ICBAS). A stereological analysis was used to quantify the distribution of organelles, with data being obtained through comparisons between the relative volumes occupied by organelles in the different oocyte regions. Life cell imaging and transmission electron microscopy analysis evidenced the presence of the first polar body, thus confirming the oocyte nuclear maturity. The present results evidenced that the most abundant organelles were the smooth endoplasmic reticulum and mitochondria. Significant differences between oocyte regions were found for lysosomes, cortical vesicles and large smooth endoplasmic reticulum vesicles. There was a normal presence of cortical vesicles, smooth endoplasmic reticulum tubules, smooth endoplasmic reticulum small vesicles, smooth endoplasmic reticulum medium vesicles and smooth endoplasmic reticulum large vesicles, lysosomes and mitochondria. However, donor oocytes displayed signs of cytoplasmic immaturity, namely the presence of dictyosomes, of smooth endoplasmic reticulum very large vesicles, and the rarity of smooth endoplasmic reticulum tubular aggregates. Results thus indicate that the criterion of nuclear maturity used for donor oocyte selection does not always correspond to cytoplasmic maturity, which can partially explain implantation failures with use of donor oocytes. ■

Authors:
Tânia Santos, Ana S. Pires-Luís, Ângela Alves, Elsa Oliveira, Carla Leal, Mónica Fernandes, Emídio Vales-Fernandes, Márcia Barreiro, Ana-Margarida Calado, Rosália Sá and Mário Sousa

Author affiliations:

TS, ASPL, AA, EO, RS, MS: ICBAS-School of Medicine and Biomedical Sciences, University of Porto, UMIB/ITR, Portugal; TS, AMC: University of Trás-os-Montes e Alto Douro, Portugal; ASPL: Centro Hospitalar de Vila Nova de Gaia/Espinho, Portugal; CL, MF, EVF, MB: Centro Hospitalar do Porto, Portugal



A. Cortical (C) and subcortical (SC) regions of a mature donor oocyte. **B.** Inner region of a mature donor oocyte. Zona pellucida (ZP), perivitelline space (pvs); microvilli (mv), cortical vesicles (cv), mitochondria (m), smooth endoplasmic reticulum vesicles (v) and tubules (t), lysosome (Ly).

Financial report of EMS budget

Financial report of EMS budget

To be presented at the EMS Board meeting in Budapest, March 30th, 2023. Budget 2022 final, overview budget 2023 and proposal budget 2024

Budget 2022, final

Incomings

The majority of incomings came from contributions of the national societies and the ECMA members with further incomings from individual members, interest rates and from job postings for non-EMS members. In summary, an amount of **€ 71 293.98** was accrued.

Expenses

One EMS Extension meeting (MCM16 Brno), 5 Supported meetings and 13 scholarships to support registration fees for young scientists were disbursed (**€ 9 940.00**). Costs for two board meetings, one GA, one GC, organization of virtual meetings, costs for professional secretarial support, for three Outstanding Paper Awards and further costs (banking, web hosting) added up to total expenses of **€ 69 847.24**. Thus, the annual balance for 2022 ended with a plus of **€ 1 446.74**. The surplus is intended to be spent for travel scholarships to IMC in 2023 and to EMC in 2024. Together with the overflow from 2021 (**€ 123 075.33**) EMS had total assets of **€ 124 522.07** as of December 31st, 2022.

Budget 2023, running; (as of February 27, 2023)

Incomings

The major revenues will again be accrued by the annual contributions of EMS members via the national societies and of ECMA members. Invoices to national societies and ECMA members had already been sent out; eventual reminders to members will be sent out later this year. Further incomings will be accrued by individual member fees and job postings for non-EMS members. Together, incomings are expected to amount to **€ 48 000**.

Expenses

No EMS Extension meeting will be supported due to IMC20 in Busan. EMS will support up to 6 Sponsored meetings (**€ 4 500**) and will issue 20 travel grants for attendance of young European colleagues at Busan (á **€ 800**, in total **€ 16 000.00**). Further expenses will include the Outstanding Paper Awards, costs for professional secretary, two board meetings and bank costs, amounting to a total of estimated **€ 54 650**.

It is thus calculated to end the year 2023 with a minus of **€ 6 650**.

Budget 2024, proposal

Incomings

Major incomings will be accrued by the annual fees of EMS members via the national societies and of ECMA members. Together with interest rates of the savings account and advertising for non-EMS members, we can expect incomings of **€ 48 000**.

Expenses

No EMS Extension meeting will be supported due to EMC2024 in Copenhagen. EMS will support up to 6 Sponsored meetings (**€ 4 500**) and will sponsor the attendance of young European colleagues at the EMC with **€ 30 000**. Further expenses will include the Outstanding Paper Awards, costs for professional secretary, two board meetings and bank costs, amounting to a total of estimated **€ 68 650**.

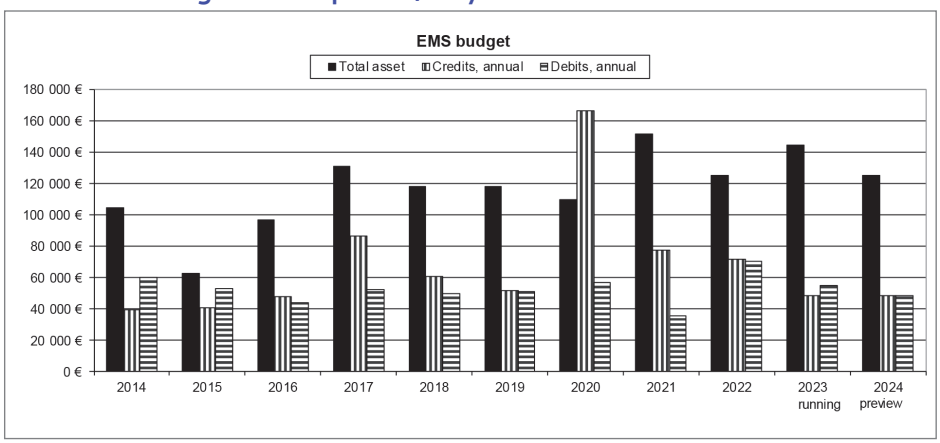
It is thus calculated to end the year 2023 with a **minus of € 20 650**. It is expected that the revenues of the EMC (usually arriving in the following year) will make up for the loss in 2023.

Annotations:
In 2020 the savings were merged with the giro account (Credits); note that Credits and Debits depict annual budget figures without overflow; Total includes overflows and shows figures at the end of the year. ■

Christian Schöfer, m.p.
Treasurer EMS

Vienna, February 27, 2023

Table EMS budget development/10 years



European Corporate member assembly (ECMA)

Corporate members 2022

PLATINUM MEMBERS

- Diatome Ltd
- JEOL Europe
- Thermo Fisher Scientific
- TESCAN

GOLD MEMBERS

- Andor Technology
- DELONG INSTRUMENTS a.s
- Hitachi High-Technologies
- Leica Microsystems

SILVER MEMBERS

- Akadémiai Kiadó
- AMETEK B.V.
- Bruker Nano GmbH
- Carl Zeiss Microscopy GmbH
- CEOS
- DENSsolutions
- Electron Microscopy Sciences
- Intelligent Imaging Innovations GmbH
- NanoMEGAS
- Quorum technologies
- SPI Supplies
- Ted Pella, Inc.
- TVIPS - Tietz Video and Image Processing Systems
- XEI Scientific Inc.

BRONZE MEMBERS

- 3D-Micromac AG
- Advanced Microscopy Techniques
- Deben UK Ltd
- Digital Surf
- EMSIS GmbH
- Eumex Instrumentebau GmbH
- Fischione Instruments
- FemtoTools AG
- Gammadata Instrument AB
- Gatan
- ISS Group Services Ltd
- JSC Nanopromimport
- Klocke Nanotechnik
- LAB PROTECT – Electron Microscope Protection
- MICROS Austria Produktions- und Handelsges.m.b.H
- Micro to Nano
- NANOVIZZ
- NenoVision
- Protochips
- Safematic GmbH
- Schaefer Technologie GmbH
- Science Services GmbH
- SmarAct GmbH
- SYNTEK Co
- Systron EMV GmbH

Please find more information about the corporate membership fees:

https://www.eurmicsoc.org/en/organisation/corporate-members-ecma/concept-constitution-fees/

European Microscopies Societies

European Microscopies Societies

Number of EMS Members by Societies (2022)			
National and regional societies			**# of members**
Armenian Electron Microscopy Society	(AEMS)	Armenia	8
Austrian Society for Electron Microscopy	(ASEM)	Austria	143
Belgian Society for Microscopy	(BSM)	Belgium	314
Croatian Microscopy Society	(CMS)	Croatia	100
Czechoslovak Microscopy Society	(CSMS)	Czech Republic	238
Dutch Society for Microscopy	(NVvM)	Netherlands	245
Electron Microscopy and Analysis Group (Institute of Physics)	(EMAG)	United Kingdom	308
French Microscopy Society	(SFμ)	France	447
German Society for Electron Microscopy	(DGE)	Germany	438
Hellenic Microscopy Society	(HMS)	Greece	36
Hungarian Society for Microscopy	(HSM)	Hungary	87
Israel Society for Microscopy	(ISM)	Israel	203
Italian Society of Microscopical Sciences	(SISM)	Italy	130
Microscopical Society of Ireland	(MSI)	Ireland	55
Nordic Microscopy Society	(SCANDEM)	Scandinavia	187
Polish Society for Microscopy	(PTMi)	Poland	170
Portuguese Society for Microscopy	(SPMicros)	Portugal	21
Romanian Electron Microscopy Society	(REMS)	Romania	80
Royal Microscopical Society	(RMS)	United Kingdom	1323
Serbian Society for Microscopy	(SSM)	Serbia	92
Slovene Society for Microscopy	(SDM)	Slovenia	114
Spanish Society for Microscopy	(SME)	Spain	180
Swiss Society for Optics and Microscopy	(SSOM)	Switzerland	82
Turkish Society for Electron Microscopy	(TEMD)	Turkey	58
Russian Society of Electron Microscopy	RSEM	Russia	21
Total			**4980**
Corporate members EMS (34 companies)	(ECMA)		36
Individual members	IND		16

European Microscopies Societies - reports

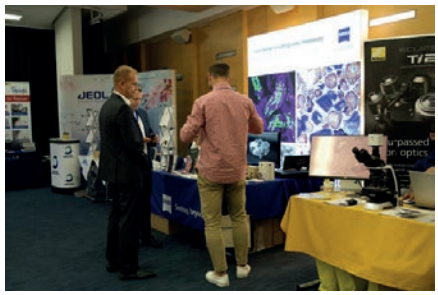
Croatian Microscopy Society (CMS)

4th Croatian Microscopy Congress (18-20, 2022, Poreč, Croatia)

The Croatian Microscopy Society (CMS) and the Ruđer Bošković Institute, Zagreb (RBI) jointly organized the 4th Croatian Microscopy Congress (CMC 2022), which was held in Poreč, Croatia, May 18-20, 2022. This edition of the Congress also marks the 30th anniversary of the Croatian Microscopy Society as an independent society and 40 years of the Society's origin as part of the Croatian Natural Science Society.

CMC 2022 brought together more than 100 researchers, industry representatives and exhibitors from the region and Europe. The three-day congress included 10 plenary and guest lectures, 20 selected talks, a poster session and an industrial exhibition. It focused on recent methodological developments in microscopy and applications of electron, light and scanning probe microscopy in biomedicine, biology, physics and chemistry of materials, and related research areas. It included invited talks, oral presentations and posters, and industry exhibits.

Highlights of the CMC included a special exhibition honoring the history of Croatian microscopy and the ceremonial presentation of the Spiridion Brusina Medal to esteemed microscopist, professor Miran Čeh



for his contribution to the education of Croatian microscopists and the improvement of Croatian microscopy.

During CMC 2022, 14 exhibitors showcased their equipment and gave presentations on the latest technological advances in microscopy. Our special thanks to CMC 2022 Gold Sponsors ITR Lab (ThermoFisher), Silver Sponsors Labena and SCAN (JEOL), and Bronze Sponsors Ansar analitika, ZEISS and Mikrolux (TESCAN).

CMC 2022 took place in Poreč, a city in the heart of the western coast of the Istrian peninsula, in Istria County. The city is almost 2,000 years old, as evidenced by the remains of ancient temples and forums in the old city center. The most valuable and famous cultural-historical monument is the Euphrasian Basilica, which is on the World Heritage List UNESCO and dates to the 6th century.

The social program of the CMC 2022 included a visit to the Institute of Agriculture and Tourism, where the participants were presented with a lecture on the history of the Institute and the method of sensory evaluation of the quality of local olive oils. As the Istrian peninsula is famous for its wines, a visit was made to a winery owned by the Cossetto family, and a gala dinner was held in a historic house in Paladinjaki, where local food and wines were served. ■

Organized by:

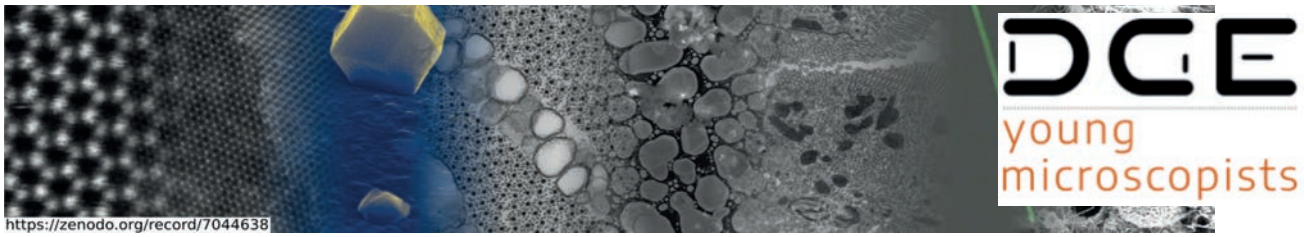
Croatian Microscopy Society

Ruđer Bošković Institute

More information about the congress can be found here:
https://microscopy2022.irb.hr/.

German Society for Electron Microscopy (DGE)

DGE's early-career organization: The DGE Young Microscopists (yDGE)



The kickoff – Milena's perspective

In late 2021, I was working towards my PhD exam in Karlsruhe and noticed that I missed the exchange with students from other universities working in the field of microscopy. The idea was to form a professional network with people happy to discuss work-related issues or chat with fellow microscopists. I aimed to meet yearly in person to discuss science and get to know others in a friendly atmosphere. Throughout the year, the concept was to organize webinars, talks, and (virtual) social events and share our fascination for microscopy via social media. The group should be tailored to Master's students, PhD candidates, and postdocs up to two years after graduation.

After I discussed this idea with the DGE board members, they were enthusiastic about having a Young Scientist's group within DGE.

We are a motivated group of early-career microscopists

Soon four others joined to formally found the working group DGE Young Microscopists (yDGE) in January 2022: Charles Ogolla (University of Siegen), Johannes Müller (Humboldt-Universität zu Berlin), Simone Rey (University of Münster), and Zhongmin Long (Karlsruhe Institute of Technology). In the past half year, yDGE has gained new board members and started implementing and developing the group's concept. Our current board members introduce themselves in the green box.

Our Activities

Online Social Events

As the first community outreach activity, Charles Ogolla, our social chair, organized a virtual game night in July.

We promote scientific and social exchange, interaction & networking

To get started, we put together a short collection of icebreaker questions. We jumped into vivid conversations about the cities we live in and fantasized about what we would do if we didn't do science. In the welcoming atmosphere, our guests started asking questions about us as a team and upcoming activities. Following the icebreaker session, all participants gathered for two rounds of skribbl.io, which raised the stakes in terms of fun and constructive competition. After 30 minutes of intense drawing and guessing, our Treasurer and Secretary, Simone Rey, emerged victorious!

We are closely connected to young microscopy societies of other countries and hosted a joined social event with the Microscopy Society of America's student council, the Royal Microscopy Society's Early-career committee, and Canada's Microscopy Student Chapters on Oct 15, 2022.

Milena Hugenschmidt,
1st Spokesperson
Physics
PostDoc at EMAT (Antwerp), PhD from Karlsruhe Institute of Technology

Johannes Müller,
2nd Spokesperson
Physics
PhD student at Humboldt-Universität zu Berlin

Simone Rey,
Secretary & Treasurer
Biology
PhD student at University of Münster

Charles Ogolla,
Social Chair
Chemistry
PhD student at University of Siegen

Falk Niefind,
Communications Chair
Chemistry
Leipzig University

Moritz Mayer,
Biological Sciences
Co-Chair
Biology
PhD student at University of Bayreuth

Website / Twitter

Falk brought our website **www.ydge.de** online in June 2022, and it currently hosts a summary of our team and its current activities. It will keep you informed about our past and upcoming activities, and you will find a link to subscribe to our mailing list. You can also stay up-to-date by following our Twitter account, which Moritz currently curates.

Beyond that, Johannes initiated adding a list of useful links and resources for microscopists. Currently, the list includes guides for microscopy methods, software packages, hardware manufacturers, consumables suppliers, and many more. If you would like to share websites or resources that you find helpful, we would love to hear them. Contact us at **contact@ydge.de**

You'll find all the links again in the orange box!

Stay tuned for future events!

Upcoming - MC2023

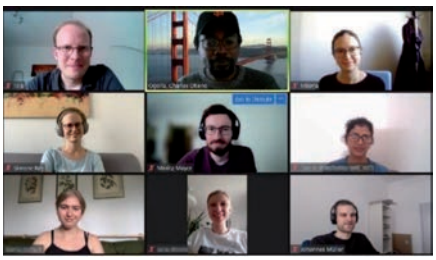
We set the foundation to connect early career microscopists across the country/globe in the online world. But we want more, bringing people together at yearly conferences. At next year's MC2023 in Darmstadt, we will host a symposium to provide a setting for students and early postdocs to present and discuss their work. We will invite students with a poster at the conference to give a short talk on their work in front of their young colleagues, to gain presentation experience in a casual atmosphere and enhance the scientific exchange. We invite everyone to join us for a fun evening after the workshop to encourage personal communication and build friendships.

We want to grow and develop ...

For now, we are a small group of students and postdocs. In the future, we want to grow into a well-established network. So we are always looking for new, motivated members to help us promote our group on social media, organize events, etc. For more infos, look for the positions at our website that are filled yearly.

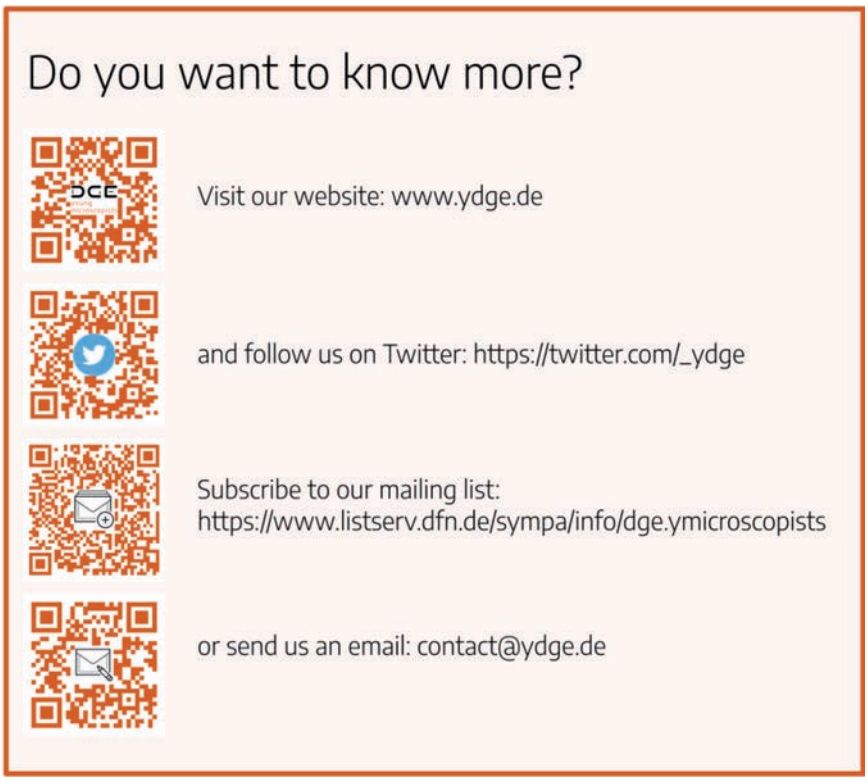
Connect with us:
Online & in person

How can you join? If you are a microscopist who is working in Germany or has another affiliation to the German microscopy community, you are a DGE member, and you're a student or have finished your PhD less than 2 years ago, you can apply! Get in touch and tell us about yourself. We will invite you to a brief interview to find out how you fit in! ■



Playing a drawing and guessing game at the social event in July.

Networking at a social event.



Electron Microscopy and Analysis Group (Institute of Physics) (EMAG)

Celebrating 75 years of EMAG, Institute of Physics, London

The electron microscopy and analysis group (EMAG) is a special interest group of the Institute of Physics (IoP) of UK and Ireland and was founded in 1947 and hence is just over 75 years old this year. On the 5th July this year, we celebrated the 75th anniversary with a special event in the new headquarter of the institute of physics in London. This was immediately followed by EMAG's first in-person getting together (EMAG2022) since the start of the pandemic.

The cutting of EMAG75 celebration cakes by IoP present Prof. Sheila Rowan (left), Prof. Valeria Nicolosi of Trinity College Dublin (center) and Prof. Mick Brown of University of Cambridge (right), the image was supplied by Dr. Andy Brown.

The celebration event started with Prof. Mick Brown of University of Cambridge giving a historical overview of the EMAG group. Prof. Brown took us through the founding of EMAG group (initially known as Electron Microscopy Group) as a meeting place for the first generation electron microscopists to exchange their experience and new developments, an idea that has not lost its original appeal for the last 75 years as testified by the continued success of the recent EMAG meetings. Prof. Mick Brown also highlighted the interesting personalities such as the grandson of Charles Darwins, Dennis Gabor and the groups of Charles Martin in Imperial and Cosslett and Oataly in Cambridge, etc. in those early days. In the 1960s, the group changed to its current name to take into account the tremendous development in microanalysis. Since 1970, the regular biannual EMAG meetings series, rotated between various universities across the land, and the associated proceeding publications since 1970 are shown to have a long-lasting impact, including the first report of the aberration corrected STEM. Today, the EMAG group continues to play an important role in uniting the vibrant and diverse electron microscopy communities in the UK and in Ireland and in enabling the training of next generation microscopists through its pre-meeting workshops. This is enriched by the past and present EMAG members on their one-minute video clips, reminiscing of what EMAG meant to them.

Prof. Valeria Nicolosi of Trinity College Dublin followed up with a planetary talk about the current role of multidimensional electron microscopy in the development of advanced low-dimensional nanomaterials. Her holistic approach to practical problem solving and the integration of electron microscopic techniques left a deep impression on the audience. The work of early career researchers is highlighted by their research slam presentation, an innovation in the EMAG meetings and was very well-received in addition to contributing a light-hearted tone to the meeting.

The president of IoP, Prof. Sheila Rowan, came to the celebration event to congratulate the EMAG group on this special occasion and cut the anniversary cakes, together with the invited speakers. The celebration is topped with a celebration dinner at the nearby London Canal Museum. The attendees not only enjoyed fine dining and interesting conversation, but were also treated to a 'pub' quiz of the 'general' knowledge of the EMAG group and related electron microscopy topics, a fitting preparation for the start of the EMAG2022 next day. ■

Hungarian Microscopy Society (HMS)

Especially in difficult times, we need to focus on the positive details.

For example, it's great and environmentally friendly that, thanks to the online programmes available, no one has to travel from one part of the country to another, or from one country or continent to another, and no one has to miss important events or discussions in common issues.

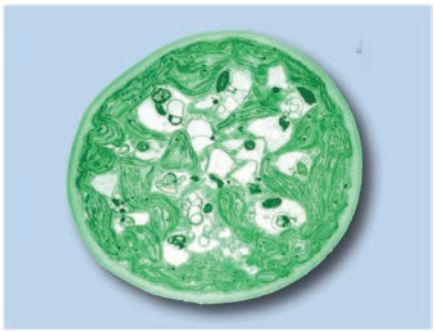
But meeting in person is different, and this May at our annual conference we were delighted to meet again. The program included three plenary lectures given by Attila Losonczy (Univ Columbia, NY), Péter Török (Univ Singapore), Roberto Balboni (Univ Bologna), and our keynote lecturer was Nobel Prize winner Joachim Frank by Zoom. Each of our lecturers's talk was great and we were especially amazed by professor Frank who presented a huge program during his hour long presentation without the faintest sign of effort and tiredness and was even ready to give detailed answers to our questions. This year our program contained a session in honor of our late colleague Árpád Barna. It was organized by Béla Pécz. After the presentations, it was officially announced that Technoorg Linda Ltd., with the moral and some financial support of HSM, will establish a prize in memory of him and the prize will be announced within a year.

What else could be shared from this quickly moving year?

Especially our colleagues interested in plant biology may appreciate the discovery of a new species, which belongs to the genus Chlorococcum and is called Chlorococcum szentendrense after the place where it was found. Every discovery gives you happiness even if we cannot declare about the majority of them that they were groundbreaking ones. Extinctions and the ruin of our environment is an everyday topic so finding a new species means good news, especially since electron microscopy was required for the detailed and accurate morphological and structural characterization of this new species. These analyses were carried out by Katalin Solymosi with her usual thoroughness and quality.

Csaba Cserép, our OPA laureate two years ago, was elected as a member of the HSM Board in May and three months later he was honoured to be elected as a member of the Young Academy of Europe (YAE).

And, in November, **István Dódony**, one of our most known and respected colleagues, was presented at the Hungarian Academy of Sciences by the József Eötvös-wreath, one of the highest awards for scientific merits.



Chlorococcum szentendrense

According to the description, he was awarded for "...the establishment of modern mineralogical research based on crystallography and materials science in Hungary, for his outstanding achievements in the research of the 'real', i.e. non-ideal and non-periodic crystal structure of minerals, and for the creation of a national school of electron microscopy, the results of which are internationally recognized in both the earth sciences and materials science".

When I read the laudation on the official website, an old story occurred to me. Before my first meet István Dódony in person I asked one of his pupils, Miklós Soós about him. His description was much shorter and nicer: 'He is a genius.' ■

Microscopical Society of Ireland (MSI)

Revelation of sites and behaviour of individual atoms in nano-materials envisaged for quantum device development

2-D materials have risen enormous interest in the last 2 decades, due to their promising, huge application potential. Functionalising 2-D materials (to include these in scalable manufacture processes, integratable in semiconductor technologies) is a great challenge. The possibility and achievement of ion-implantation into 2-D transition metal dichalcogenides (TMDCs) at very low energies was explored to controllably introduce impurities for electronic doping to tailor the work function and the bandgap, e.g., for creation of single photon emitters. It has become increasingly clear that, for successful development and functionalisation of these nano-materials, it is important to get 'to the bottom' and obtain an atomic-scale understanding of these materials, e.g., via direct visualisation of their properties, and that electron microscopy is vital in this, as it can reveal crystal-, chemical- and band-structure properties on the atomic level.

Precise sites, chemical nature and electronic structure of individual implants/ dopants/ defects/ impurities, atom movement and local electronic bandstructure in 2-D MoS_2 implanted with Se and Cr, were revealed mostly via sub-atomic high angle annular dark field (HAADF) imaging and atomic-scale electron energy loss spectroscopy, employing aberration corrected and monochromated (scanning) transmission electron microscopy (using the Titan Themis facility at the University of Limerick and also the Daresbury SuperSTEM). These observations were supported by image simulations and modelling, which in turn were backed up by DFT calculations, also predicting the nanomaterials' bandstructure. Investigations of the use and outcomes of these low energy doping methods via ion implantation of 2D TMDCs are internationally firsts.

Results comprised the revelation of Cr implanted in MoS_2 at ultra-low energies (of ~10 eV with 10^{15} ions/cm^2 and with ~2% retention) being substitutionally integrated into the Mo-sublattice, leading to bandgap shrinkage, observed via low loss EELS and supported and proven by DFT calculations using programmes (including the Model Refiner as well as TEMUL Toolkit functionalities) which are currently available online.

A further result was successful implantation of Se into MoS_2, revealing that implantation sites, which were identified by their intensities via comparison of experimental atomic resolution HAADF STEM images with simulations, as well as by EELS measurements, consist of selenium atoms occupying the top chalcogen site, i.e., substituting sulphur atoms. DFT calculations were used to measure the effect of such implants on the band structure of MoS_2 and predicted a shift from a direct to indirect band gap at selenium concentrations above ~0.1. DFT calculations of the implant relaxation showed that Se sits slightly out of plane compared to the pristine structure, which was also revealable by sub-Angstrom atom shifts in HAADF images, and which may be a source of strain in the lattice and could have useful effects for band gap engineering. ■

People involved in/contributing to this research:

U. Bangert[a], M. Hennessy[a], E. O'Connell[a], E. Courtney[a], E. Moynihan[a], A. Harvey[a], M. Conroy[a,e], Q. Ramasse[b], D. Kepatsoglou[b], H. Hofsaess[c], J. Amani[c], M. Auge[c], S. Rost[d], B. Kardynal[d]

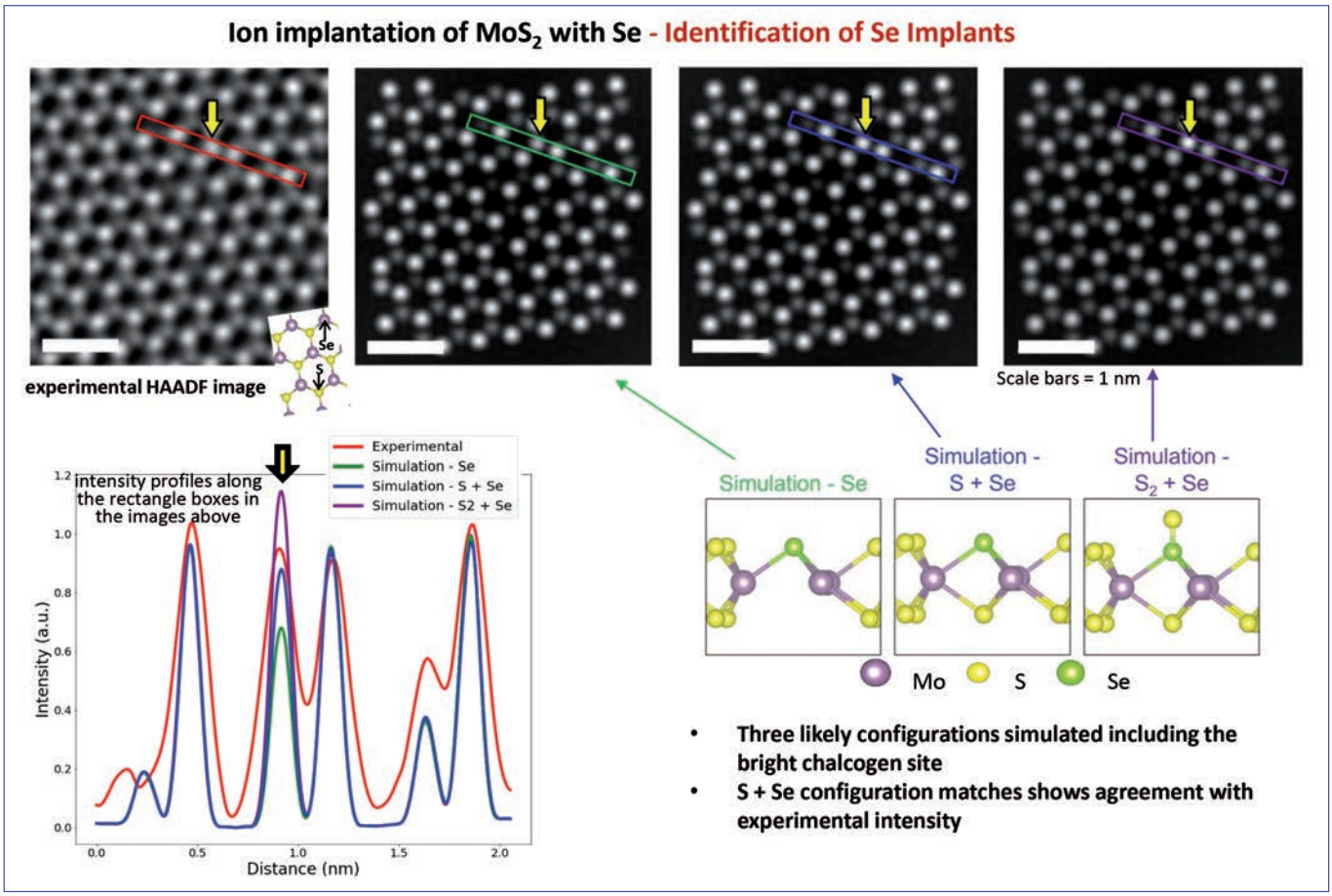
[a] School of Physical Sciences & Bernal Institute, University of Limerick, Ireland

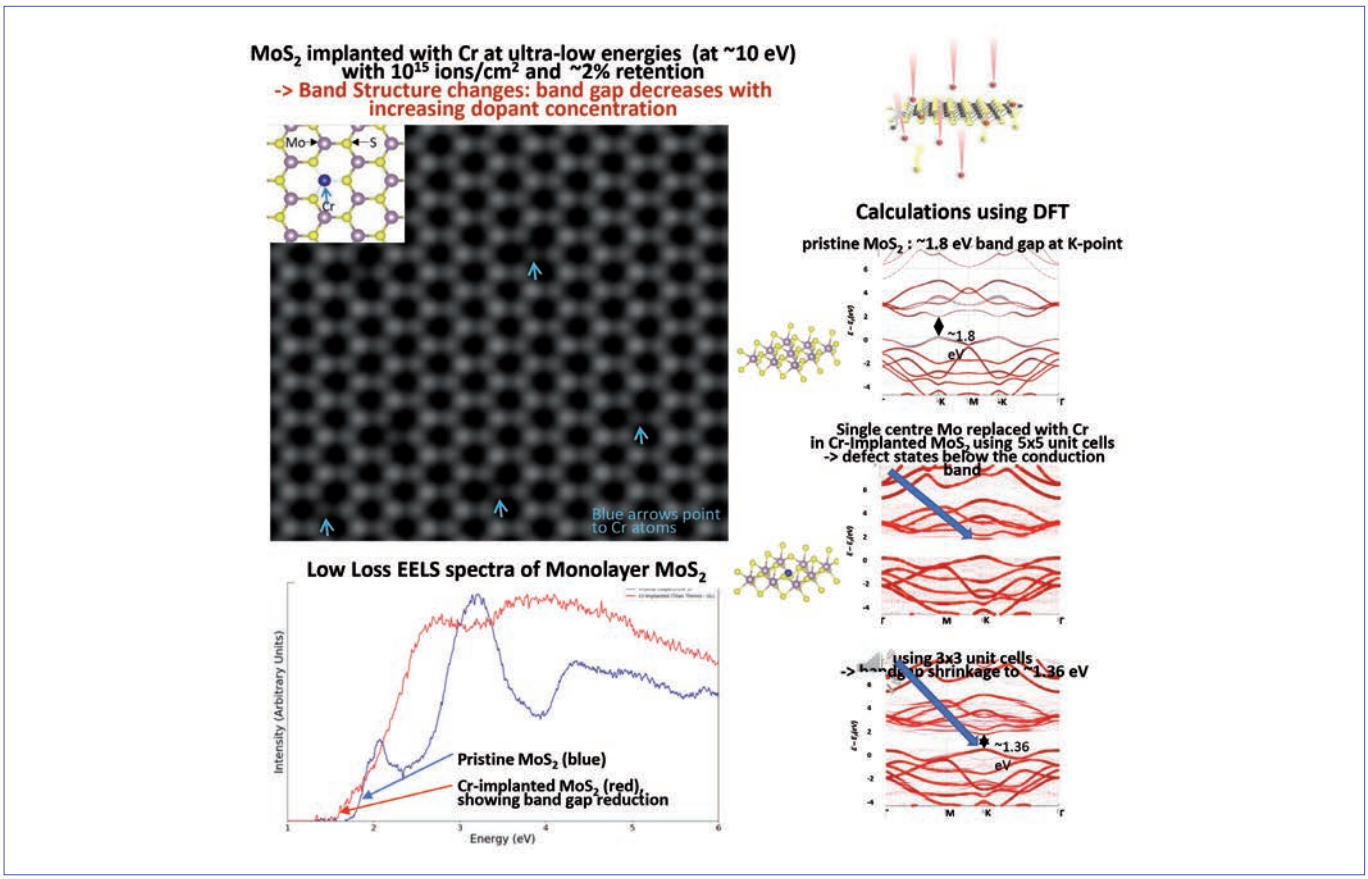
[b] SuperSTEM Laboratory Daresbury, United Kingdom

[c] II. Physikalisches Institut, Georg-August-Universität Göttingen, Germany

[d] Peter Grünberg Institut 9, Forschungszentrum Jülich, Germany

[e] Imperial College London, United Kingdom


Ion implantation of MoS2 with Se - Identification of Se Implants
Se
S
experimental HAADF image
Scale bars = 1 nm
intensity profiles along the rectangle boxes in the images above
Experimental
Simulation - Se
Simulation - S + Se
Simulation - S2 + Se
Intensity (a.u.)
Distance (nm)
Simulation - Se
Simulation - S + Se
Simulation - S2 + Se
Mo
S
Se
• Three likely configurations simulated including the bright chalcogen site
• S + Se configuration matches shows agreement with experimental intensity


MoS2 implanted with Cr at ultra-low energies (at ~10 eV) with 10^15 ions/cm^2 and ~2% retention
-> Band Structure changes: band gap decreases with increasing dopant concentration
Mo
S
Cr
Blue arrows point to Cr atoms
Low Loss EELS spectra of Monolayer MoS2
Intensity (Arbitrary Units)
Energy (eV)
Pristine MoS2 (blue)
Cr-implanted MoS2 (red), showing band gap reduction
Calculations using DFT
pristine MoS2 : ~1.8 eV band gap at K-point
~1.8 eV
Single centre Mo replaced with Cr in Cr-implanted MoS2 using 5x5 unit cells
-> defect states below the conduction band
using 3x3 unit cells
-> band gap shrinkage to ~1.36 eV
~1.36 eV

Dutch Society for Microscopy (NVvM)

The Dutch Society for Microscopy (NVvM) promotes the strong tradition of the Netherlands in light and electron microscopy, organizes meetings and workshops, and provides the network to share expertise and equipment. Members are at universities, academic hospitals, and in industry. The NVvM has two sister organisations, the Netherlands Electron Microscopy Infrastructure (NEMI) and NL-BioImaging Advanced Light Microscopy (NL-BI). The NVvM recently (co)organised several events where microscopists were seeing each other face to face again, after the long Covid period.

NEMI organised the annual 'Crossing Borders' in Naturalis in Leiden. An excellent scientific program, balanced between material sciences and life sciences, with both early career scientists as well as leaders in the field. Breathtaking talks, discussions, and a good life atmosphere: not only the bees were buzzing during this early spring day, but microscopy love was in the air.

The summer facility staff day in Groningen was a huge success with people attending from 11 different institutes, as well as several companies. The topical workgroups had lively discussions about how to proceed for the future in relation to data management, but also on how to create a job career path for microscopy scientists. The physical meetings resulted in 50 new members!

We were happy to be able to sponsor several microscopy related PhD theses; "Structural characterization of Ion translocation (…)" by Dr. Lisa Hielkema, and "Cellular cryo-tomography of nidovirus replication organelles" by Dr. Georg Wolff. We look forward to sponsor many more excellent microscopy-oriented theses in the coming years.

The NVvM organizes the 22nd European Light Microscopy Initiative (ELMI) meeting in Noordwijkerhout, The Netherlands, on 6-9 June 2023 (**www.ELMI2023.EU**). Here we hope to meet a lot of EMS members from across Europe to share our experiences in the quickly developing microscopy field. We will have an outstanding scientific program ranging from electron microscopy to lightsheet microscopy and probe development and ample attention on data management. Next to that there will be room for relaxation in the form of football matches and walks on the beach. We hope to see many of you there! ■

The NVvM Board:
Ben Giepmans, Eric Reits,
Joost Willemse, Sylvia Le Dévédec,
Marc van Zandvoort, Marijn van Huis

Contact:
info@microscopie.nl;
www.microscopy.nl

Royal Microscopical Society (RMS)

As we approach the end of 2022, the RMS can reflect on a successful and highly eventful year, in which we made a very welcome return to in-person meetings, conferences and courses as restrictions associated with the COVID-19 pandemic came to an end. It has also been a year for exciting new initiatives aimed at supporting RMS members and the wider community working in microscopy.

Around 20 RMS meetings and courses took place this year including well-attended, in-person events such as Cryo Electron Microscopy Course 2022 (Harpenden, UK), Frontiers in BioImaging 2022 and FlowcytometryUK 2022 (both held in Birmingham, UK). However, the benefits of hosting virtual events – in terms of increased accessibility and inclusivity – are now well known, and as such, we have continued to deliver online and hybrid events where appropriate. Our first ever hybrid meeting, AFM & SPM 2022, took place in Sheffield in July, and in another first for the Society, our Annual General Meetings in September were live-streamed from the Royal Society Chemistry in London, as part of Microscopy: Advances, Innovation, Impact 2022. To coincide with this event, we announced our full range of RMS award-winners for 2022, covering all aspects of microscopy, imaging and cytometry. You can find out more about all our winners at **www.rms.org.uk**

Also, among our online offerings, the International Microscopy Lecture Series has gone from strength to strength. Alongside our partners, The Microscopical Society of Canada, The Israel Society for Microscopy, and the Microscopical Society of Brazil, we welcomed talks from some of the biggest names in microscopy, including leading cell biologists Professor Benjamin Geiger and Professor Jennifer Lippincott-Schwartz. The series will continue in 2023, supported by the International Federation of Societies for Microscopy (IFSM).

Meanwhile, the highly successful ImagingONEWORLD series of talks continued to attract online audiences on Monday afternoons throughout the year. The RMS-hosted series has now been running for more than two years, having been initially established as a means of promoting science communication during Covid.

New initiatives

The RMS has always striven to be at the forefront of developments in the microscopy, cytometry and imaging community, and took forward a number of new initiatives towards that aim in 2022. In June the Society became proud signatories of the Technicians Commitment, alongside the BioImagingUK network. The Technicians Commitment is a national scheme supporting technicians working in higher education and research, across all disciplines. The RMS and BioimagingUK have jointly set out a Statement of Action, detailing how we are helping to address the key challenges affecting technical staff – both in terms of actions already taken and those planned for the future. Find out more here:
https://www.rms.org.uk/community/technician-commitment.html

Meanwhile, at the Frontiers in Bioimaging 2022 meeting in July, we officially launched our pilot mentoring scheme aimed at supporting RMS members at all career levels. The Application Coaching and Personal Mentoring Scheme offers peer-to-peer support for both career development and technical skills in microscopy, imaging and flow cytometry. Find out more here:
https://www.rms.org.uk/opportunities/mentoring-schemes.html

As part of the RMS's commitment to being a welcoming and inclusive society, we have also launched a new Equality, Diversity, Inclusivity and Accessibility policy. This consists of a working document produced by the Society's EDI&A group, recently set up to look into the RMS's existing policies and to review all its activities. The RMS strives to be accessible, inclusive and encourage diversity in all its activities. We recognise that there is still much work to do, and welcome discussion and scrutiny of all our policies and actions. Find out more here:
https://www.rms.org.uk/community/edi-a-group.html

BioImagingUK update

BioImagingUK is a community network co-funded by the Royal Microscopical Society and UKRI-BBSRC with aims around strategy, training, career development and community engagement. In 2022, together with our partners UKRI, we oversaw application of the UK Node to EuroBioImaging, successfully resulting in its ratification in October. Consisting of seven distributed sites, this Node will offer open access to a wide range of advanced bioimaging techniques including correlative, multimodal, high-content and super-resolution microscopy. In 2021/2022, BioImagingUK ran a second round of Business Interaction Vouchers generously supported by the RMS and UKRI-BBSRC, to encourage collaborations between academic and industrial partners. After a three-year gap, the network held a well-attended in-person meeting at the Francis Crick Institute in London where the next goals and priorities where enthusiastically discussed and agreed.

Save the date!

Microscience Microscopy Congress 2023 (mmc2023) incorporating EMAG 2023 takes place at Manchester Central from 4 – 6 July 2023. The flagship RMS event is returning to Manchester Central for the first time since 2019, showcasing the very best in microscopy, imaging and cytometry.
www.mmc-series.org.uk ■

Slovene Society For Microscopy (SDM)

After two years of postponements due to various covid – related restrictions, the Slovene society for microscopy (SDM, Slovensko društvo za mikroskopijo) finally met for the 4th Slovene Microscopy Symposium, which took place on May 12th and 13th 2022. The symposium brought together Slovenian and international microscopists – working in life science, material science, instrumentation, and industry.

The meeting was held in the beautiful coastal town of Ankaran in Convent hotel, providing ample space for exhibitors, sponsors and poster sessions, lively coffee break discussions, comfortable lecture hall for the talks and a wonderful sea-view evening meal on the terrace that turned into a great party.

The two-day symposium was officially opened by the Society's president, Assist. Prof dr. Kristina Žagar Soderžnik. There were two plenary lectures – Assist. Prof. dr. Samo Hudoklin (University of Ljubljana, Faculty of Medicine) introduced volumetric methods in biomedicine and prof. dr. Darko Makovec (Jozef Stefan Institute, Department for Materials Synthesis) talked about the structure of mixed-oxide nanoparticles and their adaptation to the nano size and metastable polymorphs. The delegates also listened to 5 invited lectures – two from scientists working in life science (Petra Tavčar Verdev, University of Ljubljana, Faculty of Medicine and prof. dr. Rok Kostanjšek, University of Ljubljana, Biotechnical faculty), two from the field of materials science (Assist. Prof. Nina Daneu, Jozef Stefan Institute and dr. Francisco Ruiz Zapeda, National Institute of Chemistry) and one lecture was given by a researcher working in industry (dr. Grega Klančnik, Pro Labor d.o.o.). In addition to that, there were 17 selected oral presentations, equally distributed between materials and life science, and 4 presentations from instrument manufacturers. Poster sessions presented 32 posters and provided a platform for lively discussions and an opportunity to meet old friends and strike up new collaborations.

Since the first Slovene Microscopy Symposium the talks are not divided into parallel sessions but are alternated between life science and materials science. This encourages collaboration in the different fields and brings together microscopists working with different techniques, materials and preparations. This year the Symposium also attracted a number of researchers working in industry; from pharmaceuticals to steel plants, and was very successful at integrating the academic sphere with industry.

Slovenian Microscopy Society has around 150 active members, and more than half of them attended the Symposium - the final number of participants was 125. The Society also awarded 6 scholarships targeted at students who could otherwise not secure financing to attend the meeting, which included conference fee and accommodation.

The meeting was determined a great success by all delegates. The next Slovene Microscopy Symposium is scheduled for 2024 and the preparations are already in place. We all hope that the 5th Symposium will be as successful. ■

Slovensko Društvo za Mikroskopijo
SDM
Slovene Society for Microscopy

This year the Symposium color was red.

Participants enjoyed the lectures in the newly renovated congress center of Convent hotel.

Group picture from 4th Slovene microscopy symposium

The Portuguese Microscopy Society (SPMicros)

On November 18, 2022 the Portuguese Microscopy Society (SPMicros) hosted a 1-day virtual meeting for all society members and friends of the society. Over 60 people participated in three sessions and covered a broad range of topics. The meeting started off with a presentation from Saskia Lippens (VIB, Belgium) about Career Tracks in Core Facilities. In a panel discussion moderated by Erin Tranfield (President of SPMicros; IGC, Portugal), a panel composed of Saskia Lippens (VIB, Belgium), Enrique Carbo (INL, Portugal), and Ricardo Henriques (IGC, Portugal) discussed Electron Microscopy Facility Management and shared perspectives from the Life Sciences, Material Sciences, and Technology Development topical areas. It was a productive, collaborative session of idea sharing wherein numerous similarities for running successful facilities across scientific disciplines were identified.

The second session of the meeting was focused on CryoEM in Portugal, the progress to date setting up a National Infrastructure to provide much needed access to CryoEM equipment and expertise, as well as the importance of the IMpaCT Twinning in this effort. After lunch, 4 recent publications from Portuguese scientists were featured in a session organized and moderated by Maria Luisa Jordão (INSA, Portugal) to highlight the interesting and diverse ways that electron microscopy is used in research in Portugal.

The day concluded with the 2022 SPMicros Society meeting to plan upcoming events, particularly the MFS2023 for the Spanish and Portuguese EM communities.

SPMicros intentionally decided the 2022 Annual Meeting should be a virtual meeting to be more open and inclusive of colleagues by promoting environmental sustainability, as well as time and cost effectiveness. This also gave SPMicros the flexibility to invite international guests and ultimately colleagues from Belgium, France, Germany, Israel, and the UK joined our meeting. ■

Report prepared by the conference chairs: Erin Tranfield and Maria Luisa Jordão

Outstanding Paper Awards for 2021

Winners 2021 EMS Outstanding Paper Award:

Instrumentation and Technique Development

E. Silvester, B. Vollmer, V. Pražák, D. Vasishtan, E.A. Machala, C. Whittle, S. Black, J. Bath, A.J. Turberfield,. Grünewald and L.A. Baker, *DNA origami signposts for identifying proteins on cell membranes by electron cryotomography*, Cell 184 (2021) 1110-1121.

Materials Sciences

D. Wolf*, S. Schneider*, U. K. Rößler, A. Kovács, M. Schmidt, R. E. Dunin-Borkowski, B. Büchner, B. Rellinghaus and A. Lubk, *Unveiling the three-dimensional magnetic texture of Skyrmion tubes*, Nature Nanotechnology 17 (2022) 250–255 (online December 2021).

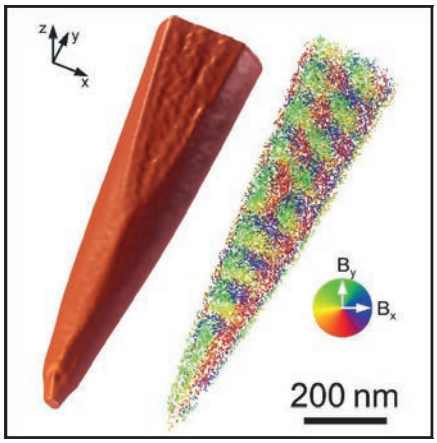
*equal contribution

Life Sciences

R. Jones, G. Bragagnolo, R. Arranz and J. Reguera, *Capping pores of alphavirus nsP1 gate membranous viral replication factories*, Nature 589 (2021) 615–619.

Report 2021 on EMS Outstanding Paper Award: Materials Sciences

D. Wolf*, S. Schneider*, U. K. Rößler, A. Kovács, M. Schmidt, R. E. Dunin-Borkowski, B. Büchner, B. Rellinghaus and A. Lubk, *Unveiling the three-dimensional magnetic texture of Skyrmion tubes*, Nature Nanotechnology 17 (2022) 250–255 (online December 2021).



Magnetic skyrmions are stable topological solitons with complex non-coplanar spin structures. Their nanoscopic size and the low electric currents required to control their motion has opened a new field of research, skyrmionics, that aims for the usage of skyrmions as information carriers. With their help, data could be transported in an extremely energy-efficient and space-saving manner in the future.

Until now, there were only two-dimensional images of skyrmions, either on the material surface or as a projection. By extending the transmission electron microscopy-based approach of holographic vector field electron tomography to low temperatures and to concurrently exposing the sample to an external magnetic field, the magnetic structure of metastable skyrmion tubes in FeGe was revealed in three dimensions with unequaled resolution for the first time.

The obtained quantitative data of the 3D magnetic induction field has allowed to experimentally identify a variety of previously unseen details in the magnetic texture of skyrmion tubes, which are buried in the volume of the sample and remain thus inaccessible to surface-related magnetic imaging techniques or to approaches that rely on determining 2D projections of the magnetization or magnetic induction only (such as, e.g., Lorentz TEM). Among the findings are the observation of subtle and unexpected deviations of the spin structure from that of Bloch skyrmions, a breakdown of this structure in the vicinity of surfaces and a correlated 3D modulation of the morphology of the skyrmion tubes. The quantitative 3D induction field not only reveals microscopic details that are expected to have a strong impact on the understanding of the interaction between skyrmions tubes in real structures, but also provides for the first time experimental evidence for the energetic stabilization of the skyrmion tubes through an energetic gain due to the Dzyaloshinskii-Moriya interaction in the center of the tubes. ■

Notes

EMS Calendar 2023

EMS Calendar 2023

Winter School 2023 - Practical course in advanced microscopy	23- 27 January 2023	Zurich - Switzerland	https://www.zmb.uzh.ch/en/teaching/Winterschool.html
Microscopy Conference 2023 (MC2023)	26 February to 2 March 2023	Darmstadt – Germany	https://www.microscopy-conference.de
Botanical Microscopy Meeting 2023	2 – 6 April 2023	Norwich, UK	https://www.rms.org.uk/rms-event-calendar/2023-events/botanical-microscopy-meeting-2023.html
22nd International Conference on Microscopy of Semiconducting Materials	3 – 6 April 2023	Cambridge, UK	https://www.rms.org.uk/rms-event-calendar/2023-events/microscopy-of-semi-conducting-materials.html
EMAS 2023 - 17th European Workshop on Modern Developments and Applications in Microbeam Analysis	7 - 11 May 2023	Krakow - Poland	https://www.microbeamanalysis.eu/events/event/60-emas-2023-17th-european-workshop-on-modern-developments-and-applications-in-microbeam-analysis
Contrast Mechanisms in S(T)EM and SEM/EBSD	8 - 9 May 2023	Krakow - Poland	http://imim.pl/
The 9th Annual World Congress of Advanced Materials-2023	8 - 10 May 2023	Tokyo - Japan	https://www.bitcongress.com/wcam2023/
Journal of Cell Science 2023 Meeting on Imaging Cell Dynamics	14 - 17 May 2023	Lisbon - Portugal	https://www.biologists.com/meetings/celldynamics2023/
BIST Symposium on Microscopy, Nanoscopy and Imaging Science 2023	10 March 2023	Barcelona - Spain	https://bist.eu/events/event/2023-bist-symposium-on-microscopy-nanoscopy-and-imaging-sciences/
ISM2023 - The 56th Annual Meeting of the Israel Society for Microscopy	23 May 2023	Jerusalem - Israel	http://www.ismicroscopy.org.il/ism2023/
22nd International European Light Microscopy Initiative Meeting	6 - 9 June 2023	Noordwijkerhout - Netherlands	https://elmi2023.eu/
EUFN FIB Workshop	7 - 9 June 2023	Zurich - Switzerland	https://www.eu-f-n.org/
8th Meeting of the International Union of Microbeam Analysis Societies	11 - 16 June 2023	Banff - Canada	https://iumas8.wixsite.com/iumas8
Nordic Microscopy Society SCANDEM 2023 73rd Annual Meeting	12-15 June 2023	Ångström, Uppsala	http://www.scandem2023.se
MMC 2023	4 - 6 July 2023	Manchester - UK	https://www.mmc-series.org.uk/
The 20th International Microscopy Congress	10 - 15 September 2023	Busan - Korea	https://www.imc20.kr/html/about/overview.php
26th National Electron Microscopy Congress (EMK26)	20-23 September 2023	Eskisehir, Turkey	http://www.emk26.com/

Application for membership

Notes

EUROPEAN MICROSCOPY SOCIETY (EMS)

Individual Member Subscription form

Individual membership of the European Microscopy Society is open to all microscopists for €25 per year. Note that the membership fee is €7 for members of European National Microscopy Societies. Please complete and return the following form* to:

Virginie Serin, Secretary EMS, CEMES - CNRS
Centre d'Élaboration de Matériaux et d'Etudes Structurales (UPR 8011)
29, rue Jeanne Marvig, BP 94347, 31055 Toulouse Cedex 4, France
email: sec@eurmicsoc.org

Prof./Dr./Mr./Ms.: _____ Last Name: _____

First Name: _____

Institute: _____

Department: _____

Address: _____

Zip code: _____ City: _____

Country: _____

Tel.: _____ Fax.: _____

E-mail address: _____

Website: _____

I will transfer 25 € in favour of account:
VILLA GABY - 285 PROMENADE CORNICHE KENNEDY
13007 MARSEILLE FRANCE
IBAN: FR76 1460 7002 2600 2625 5950 955
SWIFT (BIC): CCBPFRPPMAR

Please mail or fax a copy of your bank transfer statement to:

Prof. C. Schöfer, EMS Treasurer, Medical University of Vienna, Austria,
Tel: (+43)14 0160 37713
email: christian.schoefer@meduniwien.ac.at

Date / Signature: _____
* please print for clarity

EUROPEAN CORPORATE MICROSCOPY ASSEMBLY (ECMA)

Subscription form

To subscribe to the ECMA, please complete this form* and mail or fax to:
Virginie Serin, Secretary EMS, CEMES - CNRS
Centre d'Élaboration de Matériaux et d'Etudes Structurales (UPR 8011)
29, rue Jeanne Marvig, BP 94347, 31055 Toulouse Cedex 4, France
email: sec@eurmicsoc.org

Prof./Dr./Mr./Ms.: _____ Last Name: _____

First Name: _____

Representing the Company: _____

Address: _____

Zip code: _____ City: _____

Country: _____

Tel.: _____ Fax.: _____

E-mail address: _____

Website: _____

We select the following category (thick one)

- ○ Platinum minimum 1.000 €
- ○ Gold 500 €
- ○ Silver 250 €
- ○ Bronze 100 €

and will transfer the corresponding amount in favour of account:

SAS/MCO EMS
VILLA GABY
285 PROMENADE CORNICHE KENNEDY
13007 MARSEILLE FRANCE
IBAN: FR76 1460 7002 2600 2625 5950 955
SWIFT (BIC): CCBPFRPPMAR

Please mail or fax a copy of your bank transfer statement to:
Prof. C. Schöfer, EMS Treasurer, Medical University of Vienna, Austria
Tel: (+43)14 0160 37713
email: christian.schoefer@meduniwien.ac.at

Date / Signature: _____
* please print for clarity

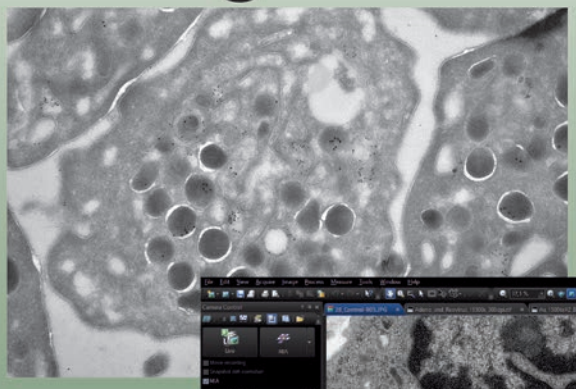
List of advertisers

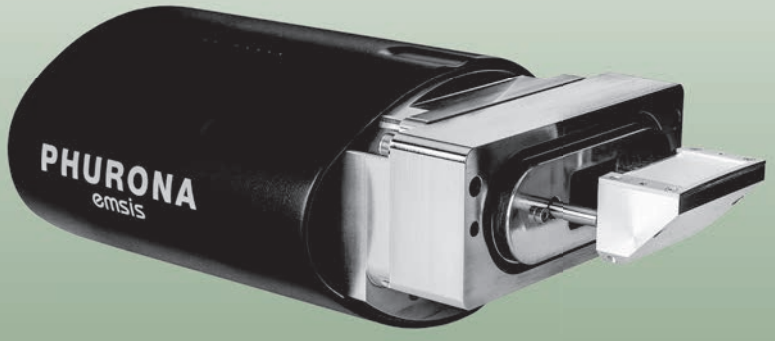
LIST OF ADVERTISERS

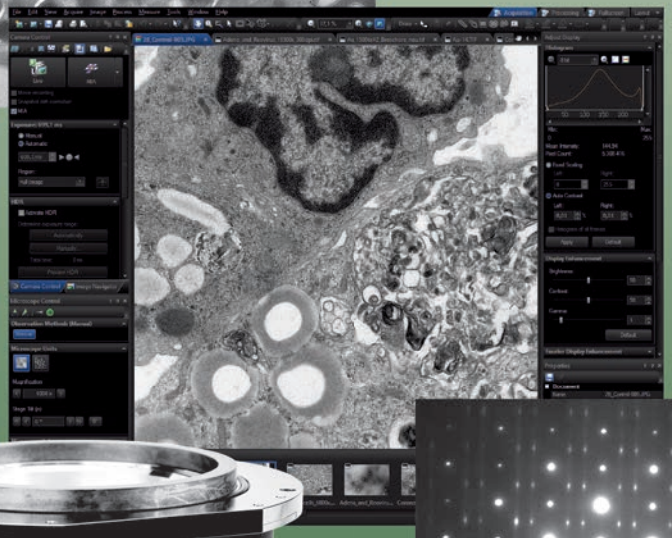
emsis

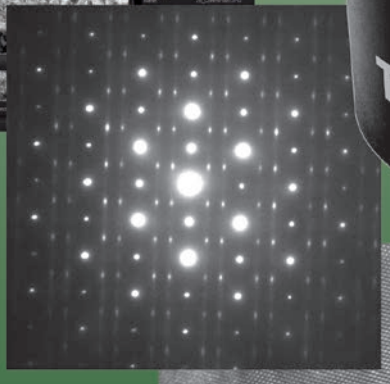
TEM Cameras and Applications

The right one...









...for your application.

EMSIS GmbH

Mendelstraße 17
48149 Münster, Germany
Phone: +49 (0)251 297962-0
Fax: +49 (0)251 297962-90
E-mail: info@emsis.eu
www.emsis.eu

JEOL

Scientific/Metrology Instruments

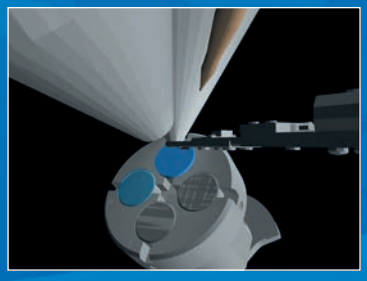
FIB-SEM System

JIB-PS500i

High Performance FIB-SEM from JEOL technologies

- Automatic TEM sample preparation
- 3D acquisition (imaging, EDS, EBSD)
- New EOS design with dual mode operation
- Check & Go directly from FIB to TEM
- Omniprobe integrated inside GUI

STEMPLING 2



New stage design

Check & Go directly from FIB to TEM

Large specimen chamber

www.jeol.com